A CITY OF FARMERS

Informal Urban Agriculrure in the Open Spaces of Nairobi, Kenya

DONALD B. FREEMAN

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McGill-Queen's University Press
Montreal & Kingston • London • Buffalo

ISBN 0-7735-0822-8

Legal deposit first quarter 1991
Bibliothèque nationale du Québec

Printed in Canada on acid-free paper

This book has been published with the help of a grant from the Social Science Federation of Canada, using funds provided by the Social Sciences and Humanities Research Council of Canada.

Canadian Cataloguing in Publication Data

Freeman, Donald B.
A city of farmers
Includes bibliographical references.
ISBN 0-7735-0822-8
1. Urban agriculture – Kenya – Nairobi. 1. Title.
HC865.Z7N34 1991 338.1'0967625 C90-090431-3

Typeset in Times 11/13 by Caractéra inc., Quebec City.

For Dawn and Kirrily

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Contents

Maps

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Acknowledgments

I am grateful to the many people who contributed to the production of this book, especially my Kenyan field assistants who worked tirelessly and cheerfully over several months to gather the raw material for this study. The members of Team A, who worked mostly within the central area of Nairobi, were Mwikali Kieti, Keith Maleche, Penninah Nduku Mutuku, and Edith Njogu. Team B, working on the northern outskirts of the city, were Abby Kamanjiri, Lawrence Karanja, and Ruth Kariuki.

Timely logistical support as well as hospitality were given generously by Dr Rob MacDonald, head of the Kenya Energy Advisory Project; Professor Celia Nyamweru, Dean of Arts, Kenyatta University; Professor Michael Darkoh, chairman, Department of Geography, Kenyatta University; Mr Jeffrey Fine, formerly of the Nairobi Office of the International Development Research Centre; and Mr Matt Stoddart. Mr Davinder Lamba and Ms Diana Lee Smith of the Mazingira Institute kindly gave me access to data from their Food and Fuel Study. York University colleagues Glen Norcliffe, Bryan Massam, and Ted Spence also gave valuable assistance.

This book has been published with the help of a grant from the Social Science Federation of Canada using funds provided by the Social Science and Humanities Research Council of Canada. The SSHRC also provided full financial support for the field research project. The Office of the President, Government of Kenya, granted approval and issued the necessary documents to permit field inter-

views. Kenyatta University gave my project official sponsorship and also a base in their Department of Geography from which to operate. The town clerk of Nairobi, Mr J. Mbugua, and the director of the City Commission Planning and Architecture Department, Mr Kibinda, gave me access to important information on land-use regulations. Additional information was provided by the Kenya National Archives. The District Commissioner's Office, Kiambu, gave approval for field work in southern Kiambu district. Diane Mew suggested many improvements in the final draft of the manuscript, and Carol Randall drew the maps.

My wife Dawn, who typed this manuscript, and daughter Kirrily have shown throughout the project far more patience than I had any right to expect, and I thank them both very sincerely.

All those who assisted in this study are absolved from blame or responsibility for any of its shortcomings. The views expressed are my own, and are not necessarily shared by supporting institutions or colleagues.

Preface

The growing of food crops in small-scale "backyard" plots, although common in urban areas throughout the world, has until very recently been overlooked as a subject for serious study. The cultivation of food crops on a somewhat larger scale in the public and private open spaces of cities, especially in the developing world, is also common, but it, too, remains almost untouched as a topic of research. Part of the reason for this lack of attention may be that this form of urban land use is seasonal and ephemeral, and so may escape the notice of researchers who concentrate on more visible, permanent forms of urban land use. At certain times of the year, however, especially at seasons of peak rainfall, many Third World cities are transformed by armies of "urban farmers" who till the open spaces to produce flourishing vegetable gardens and fields of grain and fruit. In some countries, for example Japan, these urban farmers are given government protection and encouragement through favourable land-use regulations and tax concessions. In many others, however, such cultivators – and the owners of urban livestock such as goats, sheep, and chickens – are grudgingly tolerated if not, indeed, actively discouraged, or declared illegal and harassed by urban administrators, law enforcement authorities, and planners.

In this study, the focus is on urban cultivators – their spatial distribution, practices, motives, and problems – in a large Third World city, Nairobi. The city is the commercial and administrative capital of Kenya, a nation of over twenty-three million people which is grow-

ing at a rate of nearly 4 per cent a year. The objective is to shed light on this important but little understood component of the urban informal sector in Nairobi and, by extension, in other rapidly growing cities of the developing world. Data for this study are drawn mainly from a field questionnaire survey conducted by the author and a support team in mid-1987. The survey, whose technical details are explained in Appendix 1, attempts to answer a series of fundamental questions about the cultivators of Nairobi's open spaces: Who are these "urban farmers" and where do they come from? Why do they choose to cultivate food crops in the city's vacant lands, and how did they gain the right or the opportunity to use urban open space in this way? What do they grow, and what inputs and cultivation practices are involved? How do they protect the fruits of their labours, and how do they dispose of the produce? Finally, what is the practical and theoretical significance, from economic, geographical, socio-political, and environmental points of view, of this type of informal sector activity?

The book is in three parts. Part One sets the context for a detailed examination of urban farming in Nairobi's open spaces. It draws on existing literature to explain the role of large Third World cities as magnets for rural underemployed and landless peasants and outlines the part played by the urban informal sector in directing new arrivals into activities and areas of the city that foster urban agriculture. It also traces the development and use of urban open space, so important to contemporary urban farmers, from the time of first settlement of the Nairobi area by railway builders, through the colonial years when the city was virtually closed to permanent settlement by indigenous peoples, to the modern era after independence of Kenya from Britain, when problems of rapid growth in this city of over one million people have challenged the authority and vision of administrators and planners.

Part Two describes the nature, background, distribution, and practices of the urban farmers themselves. It begins with a brief overview of the role of food producers in a sample of six municipalities in Kenya, drawing on findings in a recent survey of urban households by the Mazingira Institute, a Kenyan non-governmental research organization. The Mazingira report, in many ways, acts as a companion piece to the survey of open-space cultivation conducted by the author. Next we examine the cultivators of Nairobi themselves, their demographic characteristics, patterns of rural-urban migration,

their personal backgrounds and household characteristics that give clues to their vocations and avocations as urban farmers. Spatial variations in cultivation within the city are then examined. The questions of land tenure and occupance in Nairobi are analysed, with emphasis on the usufruct arrangements made by the sample of 618 urban cultivators interviewed during this study. Following this, the special position of women as the predominant group of urban cultivators is discussed, as well as details of cultivation practices and cropping patterns. Questions of the use of labour, the tolerance of risks and losses, and the extent of cultivation are also examined in this part of the book, together with factors of consumption or other means of disposal of the produce from urban lands. A final chapter in Part Two lists problems and issues facing cultivators.

Part Three summarizes the role and significance of urban agriculture in Nairobi at the levels of the cultivator's family, the community, and the nation. It attempts to place these in a theoretical context, which may have broader application to the study of development in the Third World.

The descriptive and analytical material in parts Two and Three are supplemented by detailed tables of data in Appendix 2 that are based mostly on the author's 1987 survey.

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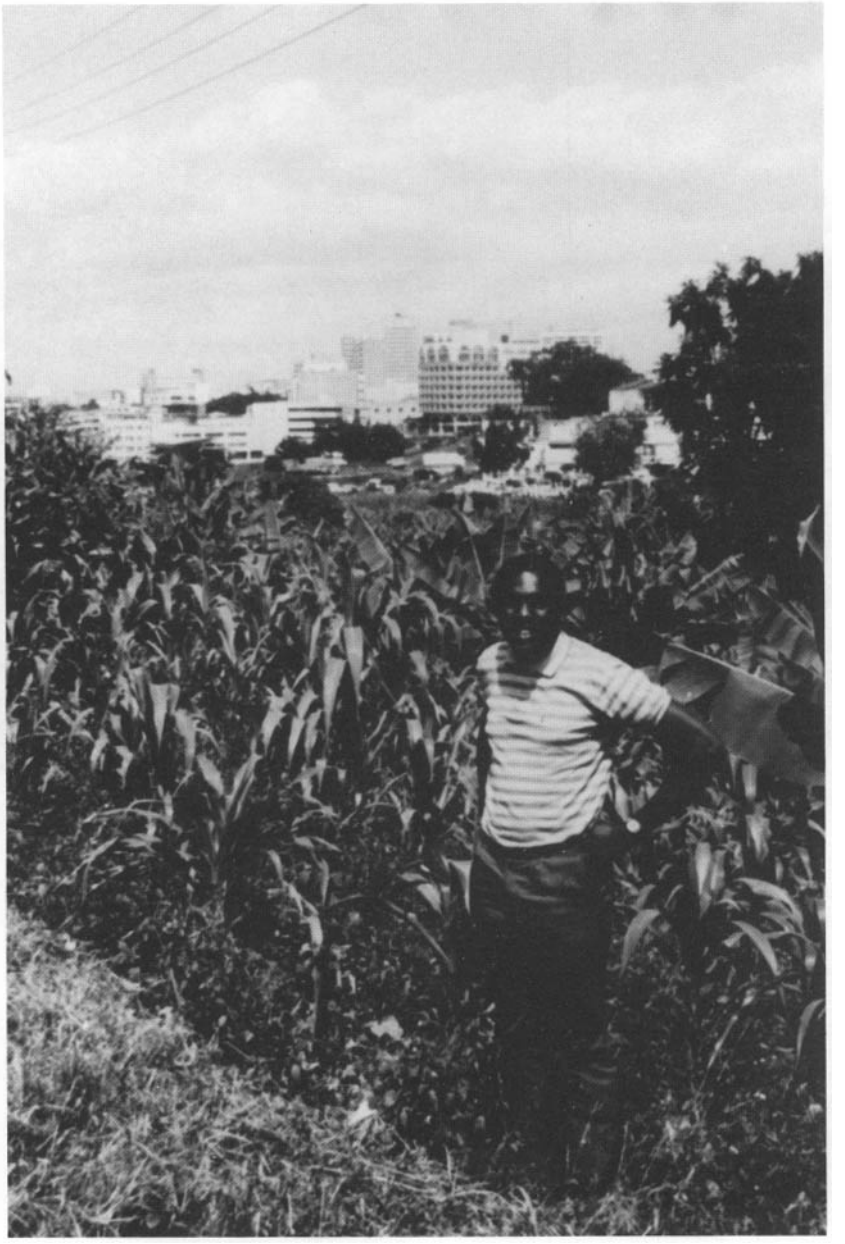
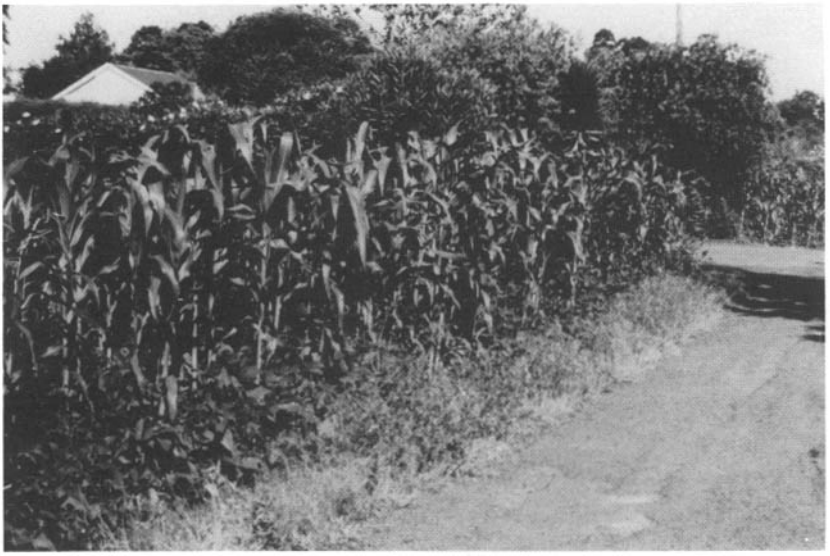
The Nairobi River, now contained in an artificial channel, was the site of the first urban shambas in the colonial capital.



Flourishing urban shambas growing bananas, maize, beans, sugar cane, and many other crops near the central commercial area of Nairobi.

Uhuru Park, Uhuru Highway, and government buildings on "The Hill," occupy land that was part of the railway lands until mid-century.

An urban shamba growing maize, beans, cabbages, and other vegetables adjacent to the Catholic cathedral and school in the heart of Nairobi's business district.

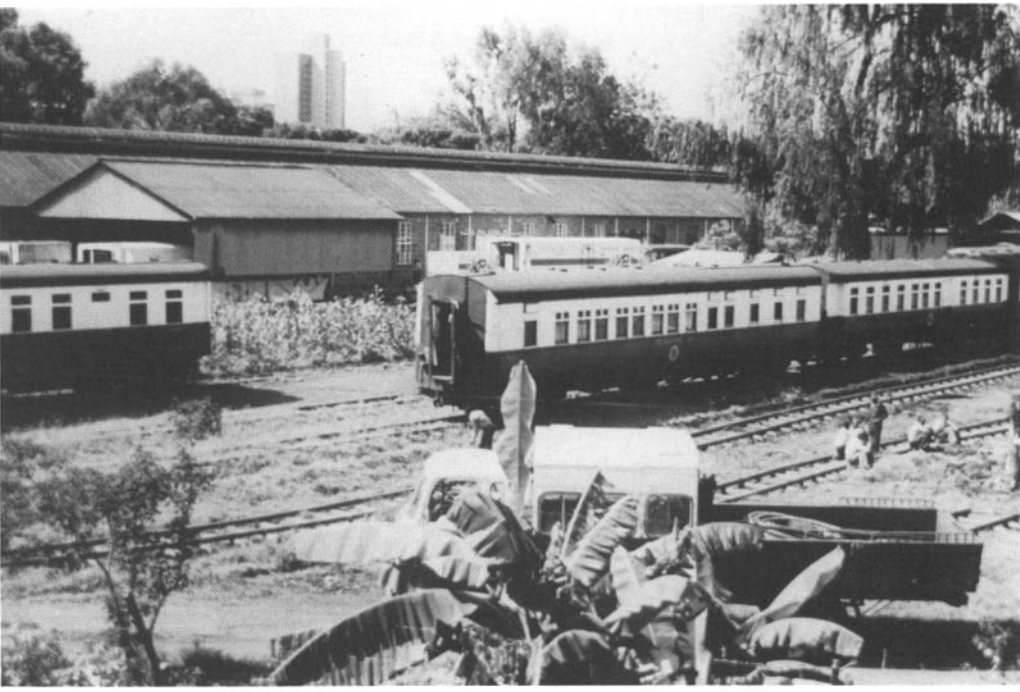


Intermixed maize and beans on a roadside verge in the upper-income residential district of Kyuna Estate, Nairobi.

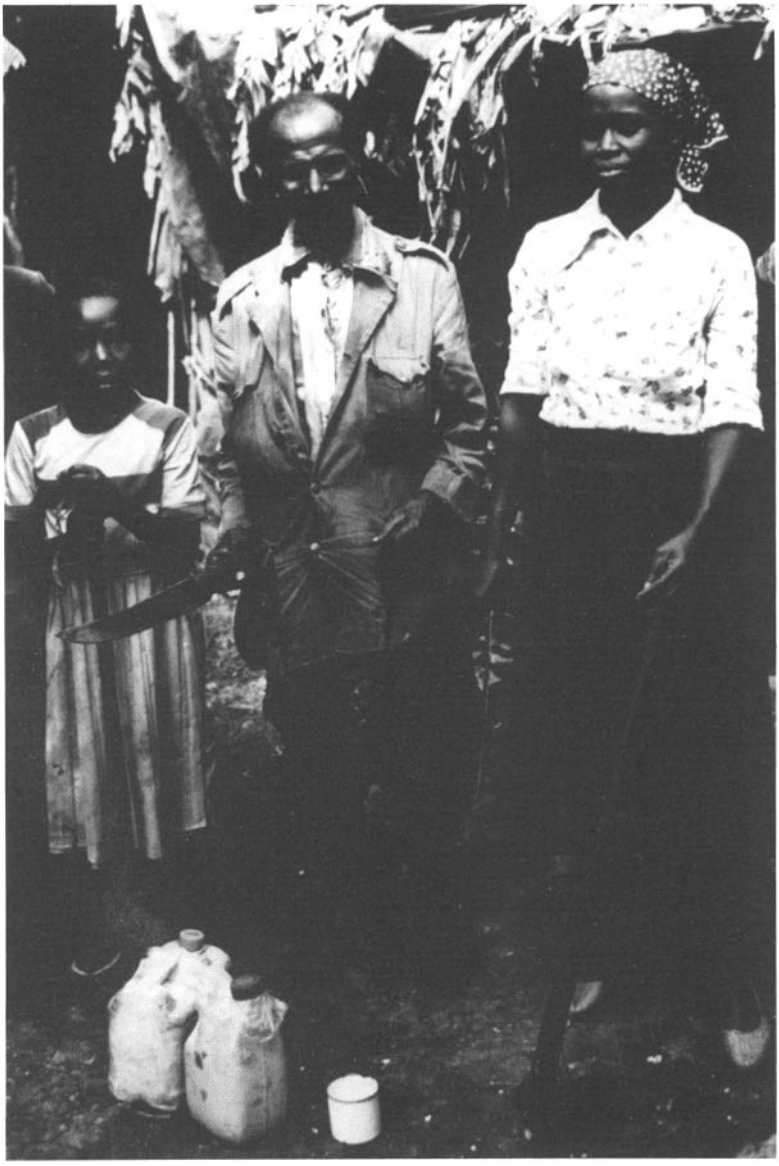
Mature maize crop alongside the dual carriageway of Waiyaki Way, near Kangemi, Nairobi. Crops produced in such areas are likely to be contaminated by automobile exhaust fumes.

Shambas compete for land with jua kali automotive workshops alongside the Nairobi River near the city's commercial heart.

Small plots of bananas and cassava in the foreground, and maize in the background, are interspersed among railway tracks near the central railway station, Nairobi.



A large shamba growing sugar cane, maize, cassava, and tree crops on the banks of the Nairobi River under the approach path to Eastleigh airfield, Nairobi.



Female cultivators outnumber males two to one in Nairobi. The universal tools of the urban cultivators are the panga (bush knife) and jembe (hoe) illustrated here.

Left Flocks of sheep, goats, and other livestock are common in the shambas of Nairobi. This flock is in a high-density housing area in Shauri Moyo.

A look-out platform for guarding the harvest against theft in an urban shamba plot, Eastleigh, Nairobi.

PART ONE

The Context of Urban Agriculture

"All over tropical Africa urban dwellers undertake some cultivation, and it is the main occupation for many in the smaller towns ... It is impossible to determine what proportion of their population gains a livelihood mainly from the land, both because many combine farming with other activities, and also because so many farmers live part of the time in town and part in a rural settlement" (O'Connor 1983, 137). As this statement indicates, urban agriculture is quite common in cities and towns of Africa. O'Connor correctly perceives urban agriculture to be an important part of the small-scale enterprise or informal sector (ibid. 146, 210). Nevertheless, most studies make the assumption that migrants from rural areas abandon agriculture when they take up residence in the city (O'Barr 1976, 14; Rempel 1978, 21). The literature is replete with descriptions and explanations of the migratory process and the nature of African informal sector activities which give the impression that rural migrants to the city suddenly find themselves denied all opportunity of pursuing their customary rural occupation. In the urban centres of Kenya, and probably in many others throughout the Third World, this assumption about the abandonment of cultivation in urban areas is far from the truth. One can only speculate on the source of this myopia in the development literature that has caused a potentially important productive sector to be overlooked by administrators, planners, and researchers. Some clues are, however, revealed if one examines salient treatises on Third World development.

The International Labour Organization (ILO), which launched one of the first planning-related studies of the informal sector, and whose publications

advocating the development of this sector have been profoundly influential, scarcely mentions urban agriculture in its major recent reviews of informal activities, but instead comments that "In rural areas people dig land to make a living. Increasing numbers forsake the land for urban life and urban jobs, meaning urban wage jobs. Most fail in this and are forced onto their own devices. They take to selling cigarettes and matches, or if they have skills, to repairing machines. They put together their own makeshift premises; in everything they provide a visual contrast to modern urban life and hence acquire a label for themselves – the informal sector" (ILO 1985, 11).

From the outset, it seems, the ILO has simply excluded urban agriculture from its definition of informal sector activities by referring to the latter as "small-scale non-farm activities" (ibid. 1972, 223). Significantly, with few exceptions, subsequent studies have followed this definition with its assumption that only "non-farm" activities are encountered in urban informal sectors throughout the world.

Recent surveys in Kenya by the present author and by the Mazingira Institute, together with a handful of similar studies in Zambia and elsewhere (Rakodi 1988) suggest that urban agriculture is both prevalent and economically significant. Empirical support for this contention is presented in Part Two of this book. The purpose of Part One is to set the stage for the detailed analysis by outlining the context in which the urban agriculture sector has developed and currently flourishes.

Chapter 1 considers how the "pull" of the large African city lures migrants into a milieu in which circumstances lead a high proportion of them to turn to farming in the vacant lands of their new urban home. Chapter 2 discusses the growth of the urban informal sector and the failure of the non-farm jobs it comprises to fulfill completely the needs of new migrants to the city. Chapter 3 outlines the creation of the open spaces in the early colonial capital that provide the lands for much of the agriculture in the city of Nairobi today. Chapter 4 considers late-colonial and post-colonial developments, particularly planning problems and their implications for urban farming.

1 The Lure of the City

The latter part of the twentieth century has witnessed a world-wide process of rapid urbanization, particularly in developing countries. This process, which is associated with post-colonial penetration by international capital of resource-rich and labour-surplus areas of the Third World, is well documented, and its major causes and implications have been examined in numerous previous studies (Lowder 1986; Drakakis-Smith 1986; Johnston and Taylor 1986). Africa has participated in this urbanization process, although the growth of African cities has attracted less attention than other major world regions. Today African cities are among the fastest growing anywhere: tropical Africa's urban population has been rising at over 5 per cent a year in the last few decades (O'Connor 1983, 47; Sporrek 1985, 20); Nairobi has gone from a population of 270,000 in 1960 to about 1,300,000 in 1988. This represents about 57 per cent of Kenya's urban population.

Although there are very old, indigenous cities in Africa as well as "show-case" capitals that are recent artifacts of newly independent regimes, the pattern of most large cities in tropical Africa owes much to the colonial "development" of imperial possessions by European powers. The latter began their conquest and annexation of Africa on a large scale after the Berlin Conference of 1884–5. Ports and railheads, for the extraction and exporting of tropical products, and administrative centres were built in each of the colonies or protectorates by Britain, France, Germany, Portugal, Belgium, Spain, and

Italy. Some of these centres, such as Lagos and Kampala, were grafted onto pre-existing indigenous settlements; but many others, for instance Salisbury (now Harare) and Lusaka, were created *de novo* on the open veldt or in bush clearings. While the resulting cities are sometimes blends of traditional urban forms with western commercial-administrative-industrial structures, many others have been described simply as outposts of Europe on African soil. There was no attempt to integrate Africans into these centres; on the contrary, the cities were regarded by the European colonizers as their own exclusive preserves. Since Nairobi is a typical example of such a colonial creation, before discussing relevant aspects of its development, there is value in examining the process whereby these colonial cities grew, and in particular the process of Africanization of centres that were once the domain of non-Africans.

A periof of expanding European mercantilism gave birth to many of these cities, which became centres for administration of tropical territories and for organizing extraction and export of products needed by the mother country. Colonial cities were often divorced from their immediate hinterlands if these were subsistence-oriented, being better connected to more distant resource deposits or to areas where white settlers had taken over farmland. In the late colonial period, the need for these centres to "pay their way" and reduce costs of imported necessities impelled colonial administrations to encourage the location of import-replacement industries in Third World cities. Industrial and commercial employment was, however, racially segregated for the most part, with the high-income occupations, as well as better housing and other urban amenities, being reserved for colonial expatriates (van Zwanenberg 1972, 17). Since they acquired all the trappings of capital cities during the colonial years, primate urban centres were usually adopted and maintained as such by African administrations once independence was achieved. Many of them still have much the same appearance, structure, and functions that they had during the colonial days.

For probably the majority of Africans who had been rural dwellers since before the advent of colonization, daily life was not greatly altered by influences of these European outpost cities until after the mid-twentieth century. This was a time when currents of sentiment among educated Africans began to run strongly in favour of independence, nationhood, and modernization. Previously, the indigenous peoples were regarded by the colonialists (from an economic view-

point) merely as farm labourers or producers of primary produce, not as urban industrial or service workers. As part of official policy, and for reasons that were often complex, Africans were discouraged or, indeed, prohibited from entering the cities. Colonial cities grew, of course, but mostly through an influx of non-African settlers, either from the mother country or from corners of the empire (India for the British, Lebanon for the French) where useful and compliant petty tradesmen, shopkeepers, and urban labourers could be recruited in adequate numbers for their colonies. City growth was, for the most part, modest during the colonial period, and numbers of urban Africans were usually small. Often they comprised a force of temporary labourers without accompanying spouses or children, who performed the most menial service jobs in the city, acting, for example, as household servants, gardeners, or nannies for Europeans. If they did not occupy servants' quarters on their employers' estates, their dwellings were usually segregated from European residential areas. The patterns of circular migration of urban Africans so frequently commented upon by previous researchers (Elkan 1976; Gould 1986), in which periodic rustication was a notable feature, arose partly out of the economic and social pigeon hole into which Africans were fitted during and shortly after the colonial period, as well as the colonial insistence that Africans had no permanent place in the city.

When the winds of change in Africa swept away the colonial and imperial structures after the 1950s, the pace of African urbanization increased dramatically. The roles of indigenes in the city also underwent a swift change with the onset of programs of repatriation of foreigners and Africanization of businesses. Segregation of housing and discrimination against blacks in the job market were quickly dismantled. In East Africa this process forced an exodus of many European and Asian businessmen and their families during the early 1970s. Their places were taken by Africans who, in many cases, were recent arrivals from rural areas where suitable business expertise and training were in short supply. This was a testing time for new African entrepreneurs, and also for the thousands of often landless "hopefuls" who flooded into the cities in the expectation of a high-paying wage job in the newly acquired business of a relative or erstwhile rural neighbour. Some enterprises succeeded and flourished. Many failed, and their employees were thrown onto a glutted urban labour market.

Although many Africans continued the circular migratory pattern entrenched during the colonial period, many more arrived in the city

with every intention of making it their permanent home. Thus the growth of cities took on a new dimension, with African townsmen now filling permanent jobs in government, commerce and industry from the highest to the most lowly occupations in the formal sector. The pace of urban growth quickened, engulfing and incorporating peri-urban African rural settlements. For the first time in many cities, the expanding population included a significant component of the locally born resident as well as the migrant. African families, commonly comprising six or more children in rural areas, retained much the same size among confirmed townsfolk. In Kenya, for example, there is no current evidence of any appreciable reduction in the size of the average urban African family. Poor urban families are often obliged to live in a single rented room in a crowded tenement. Some observers believe that the concept of the "household" may be quite inappropriate in many such cases, since several families may share the same small, ramshackle dwelling in a kind of "time-share" arrangement. In these instances, the notion of the "consumption unit," comprising people who eat together rather than those who simply share the same dwelling, has possibly greater validity as a unit for social analysis.

Despite comments about the upsurge in the rate of natural increase in urban populations, the fact remains that the present populations of such colonial cities as Nairobi contain a high proportion of comparatively recent arrivals. For example, of the 828,000 people in Nairobi enumerated at the 1979 census, only 26 per cent were born within the city precincts, and for Africans over fifteen years of age, locally born residents totalled about 5 per cent of the urban population (O'Connor 1983, 58). Continued rural-to-urban migration represents an almost inexhaustible well-spring for the future growth of tropical African cities. But this in itself comprises one of the most serious problems facing African society, since the rates of urban investment and job creation do not come near to equalling the rate of in-migration, while many rural areas are being drained of their better educated and most enterprising young people (Gugler and Flanagan 1978, 61; Rempel 1978, 27).

Students of the process of African urbanization point to the fact that the rapid urbanization of recent decades is progressing from a very low initial starting point before mid-century, under a combination of "push" and "pull" influences (Bjeren 1971, 14). This dialectic of forces acts as a useful framework for modelling the growth

of cities and their attendant structures and processes. Factors that tend to push farmers out of their home regions can be grouped under such headings as rapid population increase, deprivation, land "reform," deterioration of rural lands, modernization, and detribalization. Forces pulling Africans to large cities include opportunities for work, education, and enjoyment of urban amenities. Here we are interested in aspects of these forces that foster the growth of urban agriculture as part of the total urban milieu.

Rapid Population Increase. Most countries in tropical Africa are growing at an annual rate near 3.0 per cent, and Kenya's growth rate has hovered near 4.0 per cent for several decades: it has one of the fastest growth rates in the world. The current Kenyan population of around twenty-three million is more than twice what it was at independence in 1963. Thus, most of the Kenyan population is young, nearly half still of school age. Around 80 per cent of Kenyans live in rural areas, mostly in peasant farming communities. The burden of feeding, clothing, and educating these people has been high for the struggling economy of Kenya, and grows with every passing year. The ability of the rural areas to support this burgeoning population is now severely strained, as the country lacks new areas of high-potential land for agricultural settlement, and few natural resources to permit rural diversification.

Deprivation. Scarce development capital has often favoured urban areas at the expense of the rural majority. As a result, in the villages and farmsteads of food-producing regions in the Third World there has been a lack of basic human needs, educational opportunities, health facilities, adequate transportation, and other vital services taken for granted in large cities. Rural dwellers have witnessed the absolute deterioration of their own lifestyles and the evaporation of real choices for their children, starkly juxtaposed against the relative wealth of the urban centres. It is small wonder that these centres have attracted such a flood of migrants of all ages and backgrounds, including the sick and destitute as well as those with better education and greater resources who are willing to gamble in the "life lottery" of the large cities (Gugler and Flanagan 1978, 60). A bleak future faces most peasants who resign themselves to a precarious, rustic existence on the economic margins of their own country.

Land Reform. The process of land reform – that is, consolidation and registration of title to land and property – initiated before the end of the colonial period and now largely completed, has exacerbated the shortage of arable land in Kenya (Barber 1970, 22–3). Initially this process had the laudable stated aims of returning the lands appropriated by White colonists to the indigenous peoples and giving to each a secure title to a tract capable of supporting a family (Sorrenson 1967). Consolidation meant, however, that the equitable distribution of small plots of different soil quality, carefully and fairly apportioned by elders to each clan member in accordance with tradition, was ended in a manner which tended to favour the politically powerful (Glazier 1985, 199). Some clans and individuals, able and willing to use litigation or political influence to their advantage, acquired large tracts of the best quality agricultural land, by no means all of which is productively used. Others had to make do with lower quality, less productive land, or were rendered entirely landless by the "reform" process. Joint decision-making by a clan regarding use of the land was replaced by individual decisions made by the (usually male) head of the household or by a landlord. Women, who have traditionally been the principal cultivators in rural Kenya, were excluded almost entirely from the land entitlement process. Some peasants initially acquired land, but later lost it as banks or finance institutions foreclosed on unrepaid loans, or as large and powerful neighbours bought them out. With the passage of time, as original title-holders have died and bequeathed their small parcels to their often numerous male offspring, subdivision and re-subdivision have resulted in "farms" no bigger than the original tiny plots so abhorrent to the agricultural advisers who advocated the land reform process in the first place.

While they wait to inherit a small rural shamba or farm, a great many Africans live in a kind of exile in the large cities, and the passage of time blunts the enthusiasm of many for a return to a peasant life. A proportion will yield to the temptation to sell their inheritance.

The end result of land reform, therefore, is a rural economy composed of a very large number of tiny peasant holdings operating on a semi-subsistence basis, alongside a small number of large estates and plantations concentrating on cash crops of coffee, tea, sisal, and other exportable commodities. The numbers of landless and unemployed have increased many-fold through this process. This result, in fact, was foreseen and accepted as "normal" in the document (called

the Swynnerton Plan) that gave rise to land reform during the colonial period (Colony and Protectorate of Kenya 1955, 10). Government programs to assist the "progressive" farmers have accelerated the rate at which small peasant farmers are bought out by their larger neighbours and swell the stream of unemployed to the cities. Peasant farming is, at best, a precarious business, due partly to the inadequacy of rural infrastructure but also to low capital investment, inadequate training, and poor health of the farmers themselves.

There are also semi-arid rangelands that cover at least three-quarters of the land surface of Kenya. These are given over to pastoralism and game reserves, providing few employment opportunities or tangible benefits for the vast majority of Kenyans. Instead they contribute their share of landless to the ranks of migrants heading to the large cities.

The farmers' incomes in the smallholder areas are very low in spite of their efforts to supplement them with off-farm jobs or with high-yielding cash crops. Coffee, tea, and pyrethrum, the most significant cash crops, dominate the constricted areas, mostly in the highlands, where cultivation of these products is legally sanctioned and ecologically sound.

Deterioration of Farmland. Along with other countries of tropical Africa (notably neighbouring Ethiopia), Kenya has experienced regionally severe problems of soil erosion and rapid deterioration of the fertility of agricultural lands under a combination of heavy population pressures, inappropriate management practices, and unfavourable farming conditions, including several prolonged droughts. Population pressures have led to the clearing and cultivation of lands that are, by any measure, sub-marginal for crop growing. Poor management practices include overgrazing by domestic stock, the introduction of mechanized, "open row" cultivation, the spread of crops such as maize and sugar cane that are not particularly suited to the variable rainfall in many parts of Kenya, the production of cash crops like tobacco that rapidly deplete soil fertility, and the failure to combat such depletion or erosion. Add to this a series of severe droughts, notably in 1974 and 1984, and the conditions are ripe for quasi-permanent deterioration of soil resources as desperate farmers wring what they must from the exhausted land before abandoning it in favour of an equally uncertain life in the distant cities (Bradley 1986, 100–1).

Modernization and Detribalization. The stress placed by governments of newly independent African countries on rapid modernization, especially the concentration on large, capital-intensive development projects, has had a marked effect on speeding up the growth of large primate cities. For the first two or three decades after independence, many African countries virtually ignored small-scale agriculture in favour of the development of mining, large scale estates and plantations, and "import replacement" industries that were greedy consumers of scarce foreign exchange and imported technology and expertise. A new comprador alliance was forged by the emerging African élite and international capitalist interests, which helped prevent the further subdivision of large estates into peasant holdings. Attempts to make African capital cities international show-places, with spectacular public buildings and all the other trappings of modernization, resulted in an upsurge of displaced peasants from the cash-crop estates and the neglected small-farming areas, drawn by the glittering metropolis and the good life local politicians promised in the euphoric prelude to independence from colonial domination.

One aspect of the modernization process in Africa commented on by some observers has been the detribalization of Africans resulting from the growth of urban areas and the acquisition of a western-style of education. During the colonial period the paramountcy of "tribal-oriented" political organization was tolerated and actually promoted by a number of colonial authorities as an aspect of indirect rule or as part of the strategy of "divide and conquer." Post-colonial efforts at nation-building have stressed national unity and pride above traditional sentiments of tribal or clan loyalty, and this has been especially true in large cities where tribalism is considered to be at best irrelevant and at worst a negative force. As tribalism weakens further in the "modern" regions of Africa, other political and social forces tending to promote the growth of the technologically advanced urban sector have become relatively more pervasive. These act as pull elements luring landless and disaffected or better-educated rural residents, now bereft of strong tribal loyalties, to the cities.

Attractions of the City: Wage Work, Education, and the Cash Economy. Landlessness would not be such a problem in rural areas if alternative income-earning opportunities existed there in adequate quantities. Although the rural non-farm sector has become a development instrument of great potential in recent decades (Freeman and

Norcliffe 1985), the fact remains that it is by no means able at this stage to absorb the flood of landless and jobless flowing out of the agricultural areas of the country. The low purchasing power of rural consumers, and the low levels of capital formation in farming regions, militate against larger investments in rural non-farm job creation. In the eyes of many rural dwellers, the large cities hold their only hope of escape from the trap of rural poverty and deprivation. The city, at least up until now, has been seen from afar as the door to comfort and wealth, the repository of all the good things that modern society can provide in seemingly limitless abundance. Even in rural areas, the city goods and services that require cash for their acquisition are creeping into the remotest districts. Modern amenities and the stereotypical urban lifestyle have been powerful lures to young and not-so-young rural dwellers. The key to the door that hopefully will open to shower the migrant with its benefits is seen by many to be a western-style "white-collar" education.

The desire to obtain such a formal education for their children and themselves has driven many rural dwellers into debt or into abandoning the rural life altogether. A legacy of this type of formal education, thus, has been a "brain drain" of young, better-educated, mostly male Africans to the cities in search of wage employment. Tragically, the young migrant to the city, having received as much of an education as his or her family can afford, often finds that this is nowhere near enough to secure the coveted jobs in government, commerce, or industry. Despite relatively rapid formal sector growth in Kenya after independence, and a fixed investment rate of about 20 per cent of GDP during this period (Ikiara and Killick 1981, 6), there are simply too few jobs being created by the public and large-scale private sectors to absorb more than a small fraction of the tens of thousands of job-seekers, many of them recent school-leavers, that flood into the city year by year. In 1978, for example, out of a net addition to the national labour force of about 240,000, there were only 33,000 new jobs created in the formal sectors (Ikiara and Killick 1981, 14). The school-leaver problem has indeed become a major element of the employment crisis in African countries in recent years.

Under the prevailing male-oriented system of land inheritance, moreover, an increasing proportion of these landless migrants are female. Very often, women lack educational skills needed to compete for better wage employment. The mirage of urban jobs beckoning both male and female migrants leads to the stark reality of a glut of

workers in the job market. The result is that most of these aspirants are drawn into the urban informal sector, where many join the ranks of poorly paid "apprentices" and neophyte artisans (King 1977, 103). Large numbers of the urban poor, as we shall shortly see, also become part of the urban agricultural sector.

2 Promises Unfulfilled: Life in the Urban Informal Sector

For untold numbers of Africans, rendered landless in the aftermath of the land reform process, given a smattering of western-style education, and drawn into the urban web by forces largely beyond their control, the experience of searching for an elusive wage job proves to be a disheartening one. The glittering promise of the city evaporates like the familiar African heat mirage as the hapless migrants quickly exhaust what little savings they brought with them in the fruitless hunt for employment in the formal sector. Lacking the necessary "connections," they remain part of the amorphous body of urban unemployed or "underemployed" that now also includes more and more who were born and raised in the city. These members of the growing urban underclass survive by trading their muscle power and whatever skills they have to a relative or clan member or to any stranger in the city willing to employ or exploit them, in return for food and shelter. Alternately, they submerge themselves, sometimes by choice but often as a last resort, in the vast urban informal sector that operates in most large Third World cities.

The urban informal or intermediate sector is that part of the urban economy made up of petty commodity producers, traders, and service workers whose activities are largely unregulated by the government. They are concentrated in parts of the city where their goods and services can be sold to nearby workers in the low-wage formal and public sectors. Frequently shanty town settlements develop around these concentrations of informal sector enterprises (Hake 1977, 93).

Often run entirely by an individual entrepreneur, perhaps helped by his or her family or a few apprentices or employees, informal enterprises rarely operate out of permanent, established premises; nor do they comply with the usual standards set for labour and business practices. They tend in most cases to be run on a minimum of capital and a maximum of ingenuity. Informal manufacturers craft a wide variety of unstandardized products out of recycled materials and with home-made tools. Small food kiosks and merchandise stalls, fashioned out of discarded packing materials, sell traditional fare or modern products at meagre profit margins and in small lots. A host of community, personal, and business services are offered to wage-earners by the informal sector (Westley and Kabagambe 1978, 1).

Although important exceptions to the rule exist (Freeman and Norcliffe 1985, 95), informal enterprises tend to be strongly competitive and ephemeral, with most entrepreneurs striking out on their own after a relatively short stint as unpaid apprentices in an existing informal business. Often they rely entirely on skills and techniques learned "on the job" and on savings provided by immediate family members or by the entrepreneur him- or herself. Average capital per worker in informal activities in Kenya was 182 Kenya shillings (about 12 U.S. dollars) in 1977 compared to 2,000 shillings (127 U.S. dollars) in the formal sector (ILO 1985, 20).

The urban informal sector, which in Kenya contributed about 20 per cent of the total urban output in 1985 (ibid., 16) is now well recognized as an integral part of most large cities in the Third World (Bromley and Gerry 1979; Gilbert and Gugler 1982). It displays a myriad regional variations in its structure and roles within the larger national economy, and in the attitudes of governments and planners towards it. For this reason, the sector is difficult to define precisely (Peattie 1987, 857). After decades of harassment, urban administrators have begun to realize the value of this sector in job creation and productivity for the urban poor, and therefore active persecution of informal entrepreneurs is being replaced by tolerance and even, in some cases, positive official acknowledgment and encouragement of this sector. In Kenya the sector has recently been christened the "jua kali" (meaning, in Kiswahili, "fierce sun" or "hot sun") enterprise sector in recognition of the fact that it typically operates *en plein air*, unprotected from the elements. It is currently enjoying unprecedented encouragement (at least the verbal kind, if not actually practical help) from the highest levels of government. This does not mean that

harassment and destruction of informal enterprises has ceased, or that all types of jua kali activities are being encouraged. At lower levels of government, and especially at the level of city administration, effective policies are still strongly antithetical to the activities of this sector in a number of areas.

The recent trend towards more favourable treatment of the informal sector in Kenya is at least partly an outgrowth of the spate of attention given this sector in recent years by the foreign aid agencies, following the pioneering research by the International Labour Office (ILO 1972) and later researchers (Hake 1977; House 1981). Some scholars have complained, however, that a modern mythology has grown up around the urban informal sector, and that claims are made for its importance and potential that it cannot possibly fulfill (Forbes 1984, 170–1). The fact remains, however, that jua kali industries are a growing part of African cities; and no matter how much researchers and administrators may laud or deprecate its existence, this sector will not be stamped out or commandeered by the formal or the government sector.

URBAN AGRICULTURE AS PART OF THE AFRICAN INFORMAL SECTOR

If the crafts and services component of the jua kali sector is currently receiving overdue favourable attention from many researchers and administrators, the same cannot be said for that part of it that we have identified as the urban agricultural sector. Admittedly, there is a small but growing literature on problems of food supply in African cities (or "l'approvisionnement des villes" in francophone Africa) that should not be overlooked (Guyer 1987; Vennetier 1972, 1988). These, however, often focus on food distribution logistics and consumption patterns (Gore 1978; Sporrek 1985; Hormann and Shawel 1986) or on "various forms of social organization that deliver the goods" (Guyer 1987, 14) rather than on urban agriculture. Indeed, in the volume of research studies edited by Guyer, the authors did not set out to focus their research efforts on the subject of feeding African cities but, as Guyer admits, were "recruited" into this project after their field work on various other related aspects was already completed (ibid., ix). In most of the African studies of "approvisionnement" it is taken as given that food production is generally external to the cities, in peri-urban green belts or adjacent rural food catchment areas (Haubert

1985; Guyer 1987, 15; Lebigre 1980). Apart from a handful of researchers who have focused mostly on backyard or roof-top gardens, or the farming and scavenging of garbage dumps (Wade 1983; Sachs 1985; Jaeger and Huckaby 1986; Rakodi 1988), there has been little investigation of the nature, role, and significance of this sector in African economies, and urban agriculturalists are usually either ignored or harassed by urban administrators.

The important role played by women in this sector is also largely overlooked. This becomes clear when major research and planning studies of African cities are examined. For example, in his book *The Development Process: A Spatial Perspective*, although A.L. Mabogunje elaborates on the cycle of rural-urban migration, the failure to secure formal wage jobs, and the growth of an informal sector, he does not explicitly include urban agriculture (Mabogunje 1980, 183–8). Although he notes that women tend to predominate in the lower-income, small-scale enterprises (especially petty trading) that make up the informal sector, Mabogunje stresses the dichotomy between rural and urban and does not acknowledge that the dividing line between the two may be blurred in large African cities. He makes the important observation, however, that recent rural migrants tend to congregate in the lower occupational strata in the large African cities (ibid., 184). This has extremely important implications for cities such as Nairobi, which has a growth rate of over 8 per cent a year, a preponderance of young (fifteen to thirty-five years) residents, and the potential for much greater economic expansion in informal sector activites.

Several other researchers at least mention the role of women in the urban informal sector, but there is a dearth of detailed analyses. The ILO study, following Henry Rempel (1970), states: "It is particularly difficult to estimate how many women are employed in the informal sector or unemployed ... Many of the women are involved in informal activities which are difficult to cover statistically, for example illicit beer brewing, prostitution and *urban agriculture* (ILO 1972, 54, emphasis mine). They observe that "the worst of all possible circumstances from the point of view of seeking work is to be young, uneducated, and female" (ibid., 59).

Beavon and Rogerson (in Drakakis-Smith, ed. 1986, 205–6) point out that "In peripheral capitalist societies throughout Africa, Asia and Latin America ... women were among the worst casualties of current development strategies, lagging far behind men in access to

the benefits of development" but noting that women monopolized some sectors of informal entreprise in South Africa, particularly beer-brewing and associated shebeens, or beerparlours (ibid., 212). Sporrek (1985) examines food marketing as an aspect of urban growth in Dar es Salaam without broaching the subject of urban agriculture. In his treatment of informal sector food marketing, he does, however, have a brief section dealing with the role of women traders. In contrast to the west African situation in which women, called "market queens" by Gore (1978, 292), dominate produce marketing, food distribution in Dar es Salaam reveals the relatively minor role of women. This Sporrek ascribes to the effects of the Islamic religion with its traditional male dominance of manufacturing and commerce (Sporrek 1985, 177–85).

One of the few focused analyses of the role of urban agriculture in an African city is contained in a more recent, detailed examination of planning and policy aspects of urban gardens in Zambia (Rakodi 1988, 495–515). Pointing out that urban cultivation is widespread in Africa, Carole Rakodi is critical of the failure of planners and administrators to recognize the significance of this activity (and the participation of women cultivators) in the overall pattern of urban land use: "Scant attention has been paid to agriculture in the literature on urban women, despite its relevance to the production/reproduction debate, to the understanding of household survival strategies, and especially to womens' role within these" (ibid., 498). Drawing on unpublished survey data of Lusaka collected in the 1970s, Rakodi interprets the increase in urban gardens as a response of people to the failure of wages to keep pace with the costs of urban life (ibid., 509).

Studies of the informal sector in Kenya tend to ignore both the significance of urban agriculture and the role of women. Van Zwanenberg, in his detailed study of the growth of slums in Nairobi, does not mention urban farming (van Zwanenberg 1972). Andrew Hake, in his insightful book *African Metropolis: Nairobi's Self-Help City*, documents the upsurge of African immigration into the city since colonial times, but again says little about cultivation in his chapter dealing with "self-help jobs." He does, however, make one observation that is extremely pertinent to the question of whether urban agriculture should be seen as part of the urban informal sector:

> Many of the women of the self-help settlements had a patch of waste land on which they cultivated crops of maize, beans, or other vegetables. Such

cultivation was illegal within the city, and was particularly discouraged by the Colonial power during the Emergency [the Mau Mau rebellion of the 1950s], as the crops were believed to provide cover for fugitives or for the growing of Bhang (marijuana). In 1964–65, when there was an acute maize shortage in Nairobi and throughout the country, groups of supervised prisoners could be seen slashing maize growing in, for example, the "Town Centre" vacant plots and road reserves in Eastlands, because in the eyes of the authorities the crops were illegal (Hake 1977, 191).

As this indicates, urban agriculture in Kenya has been treated as illegal by a succession of colonial and post-colonial administrations, putting it within the accepted definition of "informal." But in addition, Hake's treatment of the subject of women cultivators seems to echo the common notion that urban farming, although widespread, is an unimportant pastime indulged in purely by city housewives, one that might be regarded more properly as a form of recreation or as disguised unemployment. The reference to slashing of urban crops by colonial authorities is ironic, because slashing of maize is still being carried out by City Commission askaris, and the argument used by colonial authorities about maize plots being a hiding place for undesirables is still used by local authorities. Typical of current official attitudes is the reported speech by the Rift Valley Provincial Commissioner on Madaraka day, June 1987: "Maize farming in the town [Nakuru] would not be allowed because thugs hid in the shambas ... The Administration would deal with the few who had decided to plant maize on plots in the town" (*East African Standard*, Tuesday, 2 June 1987, 28). In the same month, members of the York–Kenyatta University survey team reported witnessing an instance of the destruction of crops by City Commission askaris in Kaloleni, an inner city housing estate near the main railway marshalling yards. It is interesting to compare these attacks on urban agriculture with the statement by Rakodi (1988, 502) that maize crops in Lusaka, Zambia, are regarded by city officials as a health hazard (allegedly harbouring mosquitoes) and are periodically destroyed by the authorities. It appears that official antagonism towards urban agriculture is widespread.

The urban informal sector in Nairobi has also been examined in detail by William House, who identifies two sub-categories, namely the "community of the poor" and the "intermediate sector"; but his interview sample only targetted "enterprises ... [that] operated out

of a temporary sructure" (House 1981, 358), again excluding by definition the cultivation plots or shambas of urban farmers. Failure to consider urban agriculture, or the adoption of a wholly negative attitude towards it, thus ignores the potential importance of the incomes, productivity, intersectoral linkages, and economic leverages provided by this sector.

In more recent years, the "development literature gap" on the urban agricultural sector and its dominance by women have begun to be redressed somewhat following the 1985 São Paulo Conference on alternate urban development strategies, and the concomitant efforts by Ignacy Sachs and others to highlight the subject of cultivation in the cities and the problems as well as the advantages of such activities (Sachs 1985, 5). The effort was spurred by the United Nations' declaration of International Women's Year and the attention this focused on the activities of women, especially as regards food production, in the Third World (Overholt, Anderson et al., eds. 1985; Sachs 1985). Particular attention has been given to the "religious, historic, familial, and cultural" barriers to participation by women in enterprise and development generally (Dulansey and Austin 1985, 105). In some of the most recent literature there is a suggestion that African urban cultivation may be a survival strategy particularly for less well-educated women who are generally unable to afford to own property or to compete with males for coveted urban wage jobs (Rakodi 1988, 509).

POSSIBLE EXPLANATIONS FOR URBAN AGRICULTURE

A detailed explanation of why residents of certain large African cities undertake the cultivation of open spaces must await the evaluation of evidence presented in Part Two of this study. It is possible at this stage, however, to propose some broad deductions based on what is known of urban economies generally and the African case in particular. The veracity of these can then be considered in the light of the empirical data collected in the Mazingira study and the 1987 survey by the author.

First, it seems clear that, in the eyes of many of the urban poor who participate in informal sector activities, family needs cannot be met entirely from either wage jobs or the informal craft/service enterprise sector. It is also possible that barriers to entry of new urban

residents into these sectors (in terms of acquired skills, or capital, or available business sites and raw materials, or all of these) may be sufficiently high to exclude a proportion of urban residents, particularly women.

It is also clear that the risks from harassment and destruction of crops by authorities, loss through theft and predation, and other drawbacks to cultivation of urban open space are outweighed by the perceived advantages and gains from cultivation, since the practice is spreading in the cities. For some, the advantages may be set in the context of reduction of other risks, such as the risk of starvation or malnutrition for themselves or their families if they do not do something to supplement their cash incomes, or if they should be thrown out of work in the precarious labour market conditions that often prevail in large Third World cities, or if they should become too ill to go to work. Even the more affluent urban residents may feel the incentive to grow illegal crops; those in Nairobi, for example, may be goaded by the memory of the national food shortages of the early 1980s when lines formed outside city supermarkets to wait for meagre supplies of basic foods like maizemeal.

The evidence is undeniable, both from empirical studies and from government census data, that the ranks of the urban poor are increasing with each passing year. Exacerbating this trend towards burgeoning urban poverty is the problem of inflation of urban food prices, and the rising costs of other necessities for the urban household that threaten to outstrip the precarious incomes of the poor in many large African cities.

These speculative explanations for the existence and prevalence of the urban agricultural sector will be considered together with other hypotheses in the sections that follow, in the light of historical information and quantitative data obtained in the surveys of urban cultivators in Nairobi.

3 Open Spaces and Colonial Views: The Early Years in Nairobi

The plentiful open spaces in Kenya's capital, now being encroached upon by urban cultivators and jua kali enterprises, owe their existence to events that transpired early in the colonial period of the city's history. A brief chronicling of these events will serve to highlight the specific factors that have set the stage for the later development of urban agriculture.

Nairobi has seen very rapid growth from its beginnings as a bleak railway workers' camp at the western edge of the Athi plains at the turn of the twentieth century. From the very first, its administrators strove to provide it with ample open space, which now comprises at least a quarter of the city area (even when the "formal" areas of farm, range, and forest/game reserve land on the urban outskirts are excluded). An examination of documents associated with the historical development of Nairobi makes clear that there were three main reasons for the generous endowment of public and institutional open space in the city. The first two, discussed in this chapter, were: the determination of the railway authorities, who laid out the initial settlement, to gain control of adequate open land for future needs; and an obsession of the early British administrators with questions of health, sanitation, administrative expense, and racial segregation. The third factor is one that became influential in the later years of the colonial period and since Kenya's independence. This is the "city beautiful" ethos among planners in Nairobi that continues to lay stress on the expansion and preservation of parks and boulevards, planned

residential neighbourhoods and riparian/forest reserves even at the expense of a considerable number of low-income residents of the city with whom administrators have come increasingly into conflict. This factor will be discussed in the following chapter.

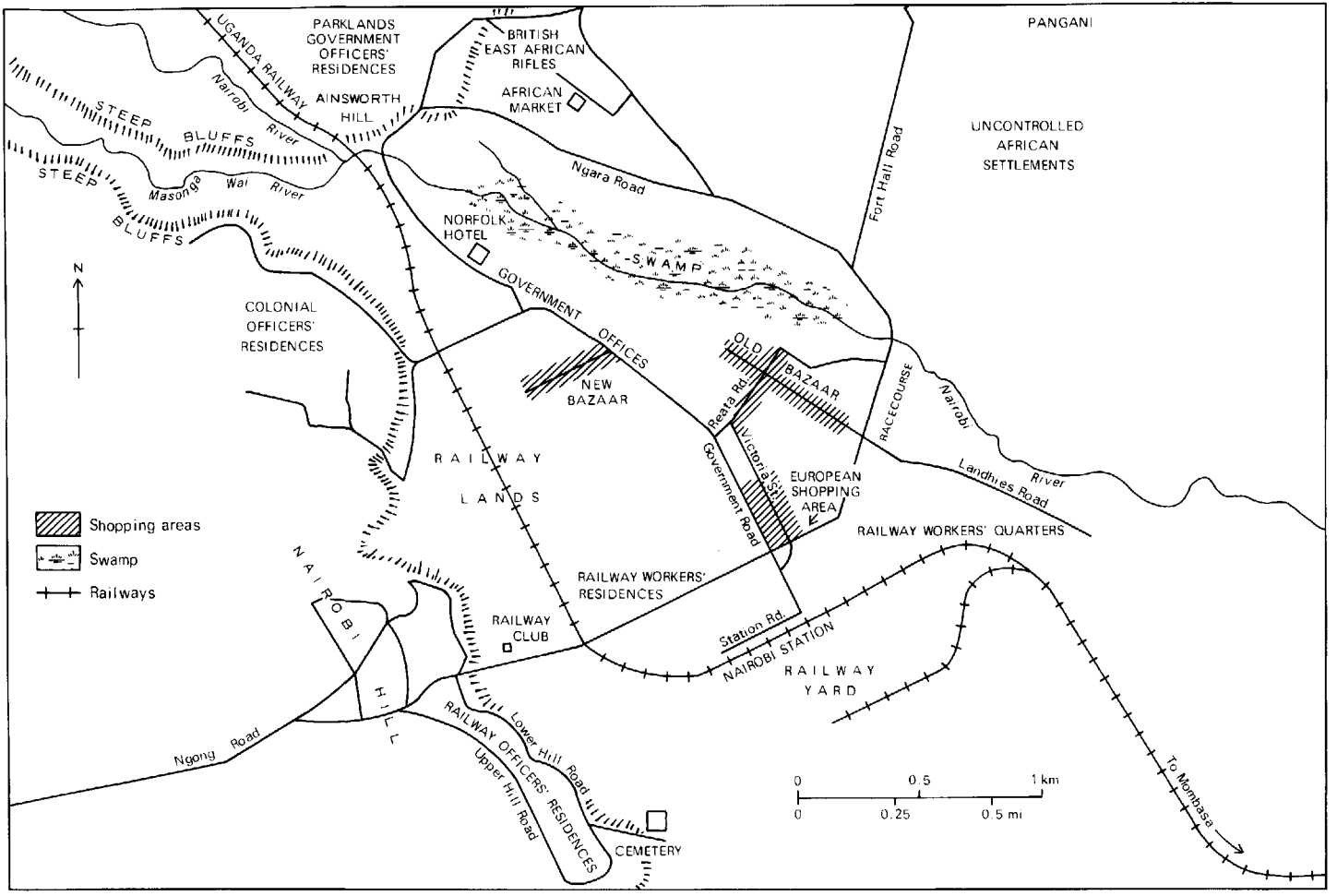
THE RAILWAY LANDS

On 30 May 1899 the Uganda Railway reached the site of Nairobi. Beyond this point there was a significant increase in railway gradient (a slope of 1:83, as against an average slope of 1:323 from the coast to Nairobi), necessitating the addition of extra locomotives on westbound trains. Consequently, a railway depot was needed here. Being about halfway between the coast and Uganda, moreover, this was a good location for a repair and maintenance workshop. To oversee this operation Nairobi was chosen to be the site of the railway headquarters.

The building of the railway headquarters at this location was the responsibility of its chief engineer, Sir George Whitehouse, who was determined to control land-use policy in the new settlement and who had "obtained from the Foreign Office the authority to appropriate all land required for railway purposes, since the railway had made costly experiences at the coast [speculators in the Mombasa area had bought up land in anticipation of railway developments and had charged extortionate prices for land needed by the railways]" (Thornton White, Silberman et al. 1948, 11). In fact, the railways appropriated far more land than they could use in the foreseeable future, and the subsequent development of the town of Nairobi was very much subordinated to, and shaped by, the railways.

The railway marshalling yards and terminal facilities were laid out over a large area of flat land to the south and east of the town (Map 1). This huge expanse of workshops, sheds, and open space devoted to railway uses still acts as a dividing line between the central business district and much of the industrial area of Nairobi. On the northern side of the railway yards, the low stone buildings of the Nairobi railway station stand as a reminder of the origins of the modern metropolis that has spread out like an open fan from this point.

For the first half of this century, the railway right-of-way ran through the commercial heart of the city, frustrating attempts to produce a coherent urban land-use and traffic plan until the main line



Map 1. Nairobi, circa 1906

westward was rerouted away from the core of the city at mid-century. This major realignment, which involved removing the section of track that ran from the western end of the Nairobi station, along what is now Uhuru Highway and Waiyaki Way, had been suggested as early as 1927 by a government consultant, F. Walton Jameson (Hake 1977, 44). The new alignment took the rails south of Haile Selassie Avenue, skirting "the Hill" with its European residences originally occupied by railway officials, and following the northern banks of the Nairobi dam towards Dagoretti Corner, a major African market centre near the former Kikuyu reserve. A wide strip of land on the west of the central business district was thereafter vacated from the railway station to Westlands. As shown in the next chapter, this gave the opportunity for the British administration in the later years of the colonial period to implement an ambitious plan to upgrade and expand the city and to make it a showpiece of a modern, well-planned colonial capital.

HEALTH, SANITATION, ADMINISTRATIVE EXPENSE, AND RACIAL SEGREGATION

Nairobi may have been a well-chosen location for a railway headquarters, but it was criticized in the early years as a poor location for a city from the point of view of public health. At its high elevation (1,700 metres above sea level) it admittedly escapes many of the disease problems associated with cities in humid tropical lowlands, and the climate of the area has always been regarded by the British as quite suitable for European settlement. The fledgling capital was, however, built on the banks of a malarial swamp, choked with papyrus, into which the Nairobi River emptied after its emergence from a narrow valley cut into the dissected upland of the Kikuyu escarpment. Flat, poorly drained, and relatively infertile black cotton soil on a phonolite base covers most of the present urban lands in the southern and eastern quarters of the city. At the time of the first European settlement, the swamp and the adjacent Athi plains teemed with game animals. Although these were rapidly exterminated in the vicinity of the growing town, the squalid and cramped workers' quarters and bazaar soon attracted other kinds of unwelcome fauna, including disease-carrying rats.

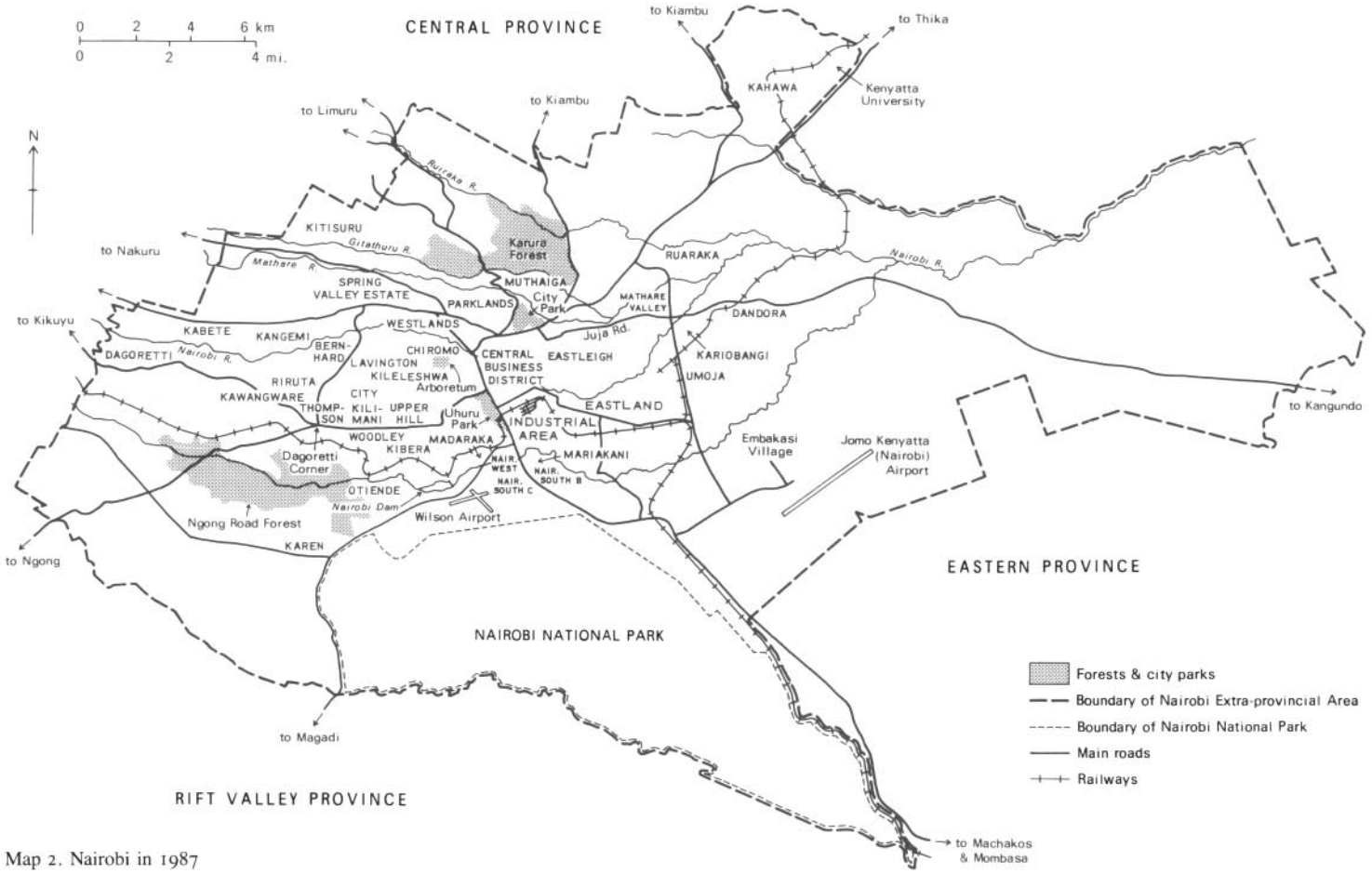
The northern and western parts of Nairobi, by contrast, comprise parallel, southeast-trending ridges and ravines with better-drained,

deeper, and more fertile red loams formed on trachyte. These areas were initially heavily forested, and patches of the original vegetation remain in the Karura forest reserve and the City Park, in the northern suburbs. More recently, exotic tree species have been planted in and around Nairobi, notably Australian eucalypts and acacias, as well as softwoods from Europe, North America, and the Pacific. The Ngong forest reserve, on the southwestern side of the city near the Nairobi National Park, is planted mostly with these exotic species. The National Park has so far been left largely in its natural state, a precarious buffer zone of forest and rolling grassland, inhabited by native fauna, between the city and the Masai grazing lands to the south (Map 2).

To the west, the city is bordered by intensive peasant farming areas once part of the Kikuyu reserve. This was one of twenty-four "native land units" formerly administered by the Native Lands Trust Board for the colonial government. To the north and northeast, commercial coffee, tea, sisal, and dairy estates, now mostly in African ownership, were part of the "White Highlands" alienated by the colonial regime for exclusive European settlement.

Shortly after the East African Protectorate was proclaimed in 1895, the British policy on colonial administration and the building of tropical settlements was profoundly changed as a result of the discovery (by Ronald Ross of the Indian Medical Service) that the *anopheles* mosquito was the true vector of malaria. Previously it had been thought that unhealthy vapours ("miasma"), or even certain types of vegetation (the "fever tree") had a role in spreading malaria. In his report to the Colonial Office in 1899, Ross recommended that, in all of Her Majesty's tropical colonies, all breeding pools of the *anopheles* should be drained, or failing that, sprayed. Houses should be constructed on elevated sites, with screened windows and mosquito netting in the bedrooms of colonial officers (CO 1899; quoted in Frenkel and Western 1988, 215). The debilitating fever was thought to be transmitted only by mosquitoes that had previously bitten infected Africans, particularly children who "almost without exception suffer from continuous malaria" (CO 1900, 885–7; quoted in ibid., 216).

Draining of ponds to protect the health of all colonial subjects was eliminated as a solution due to its obvious expense and uncertain effectiveness. Instead, the Colonial Office issued a directive to all tropical colonies requiring that "all new buildings, as far as practicable, and with due regard for expense, be located away from native



Map 2. Nairobi in 1987

quarters, clear of jungle, at a distance from stagnant waters, and where possible, on high ground" (CO 1901, 885–7; quoted in ibid., 216).

The British East African Protectorate was established in 1902 in the area previously administered by the nearly bankrupt Imperial British East Africa Company. When Nairobi was chosen to be the colonial capital two years later, the British Foreign Office once again admonished its protectorate administrators to pay particular attention to questions of health and sanitation in laying out this (and other) new settlements for its colonists, who had been permitted to settle here to help the government pay for the high cost of administration and railway construction:

> In close connection with a satisfactory growth of the white population, come the questions of new townships and of sanitation. You should be most careful that, so far as means permit, every existing station should be put in a thoroughly sanitary condition as regards drainage, habitations, and the adoption of the means recommended by modern science against the spread of malaria by mosquitoes ... (Lord Lansdowne to Sir Donald Stewart, 8 July 1904. FO 2/833; quoted in Mungeam 1979, 97).

This caveat was elaborated upon a year later:

> ... it is especially important with regard to townships that they should be carefully laid out with due regard to the reservation of sufficient land for Government and Municipal purposes, and that attention should be given to provide for all requirements both for the purposes of business, pleasure, and health that may arise in towns comprising a variety of nationalities and situated within a few degrees of the Equator (Report of the Land Committee, Nairobi, 1905; quoted in ibid., 332).

These pronouncements contain some points of significance for the ultimate development of land use, residential segregation, and open space in Nairobi. First, it was accepted that the city would be multiracial. In the early settlement there were, indeed, many Indians (who remained as clerks, tradesmen, and labourers following their involvement in the construction of the railway), Somalis, Swahili, Sudanese, and Arabs, but relatively few local Africans. The directive about separating European residences from "natives" was aimed, in the new settlement, against these non-local groups who formed the

underclasses of Nairobi. The caveat about reserving sufficient open space, however, seems to have been unnecessary and rather belated in this case, since as we have seen the railway authorities had made certain that open space in the settlement was abundant.

A second point of emphasis in these directives was their preoccupation with prevention of malaria among British colonial administrators and not, as Frenkel and Western point out in their study of Sierra Leone, with the health of the general populace, including their African wards. Frenkel and Western present evidence that racial overtones were strongly present in the policies of the British Colonial Office, and had been translated into action in new colonies such as the East African Protectorate under the guise of measures to promote health and sanitation. Residential segregation was one of the key provisions of this racially inspired policy (Frenkel and Western 1988, 217).

Undoubtedly there is truth to this claim in the case of the Kenya colony, as is shown in a number of unofficial comments and statements in Foreign Office records (for example, outright advocacy of racial segregation in the Report of the Lands Committee, quoted in Mungeam 1979, 332). But it seems that the main motive for health measures outlined in Foreign Office directives was the cost and convenience of administration rather than race. To protect the health of all the populace would have been prohibitively expensive to the penny-pinching colonial administration. They opted instead to protect only their own administrators and staff, a relatively small and inexpensive operation.

Whatever the official Colonial Office view, it is doubtful that early administrators in Nairobi needed much prompting to consider measures to ensure improved sanitation and racial segregation after the series of bubonic plague outbreaks in Nairobi (in 1901–2, 1904, 1911, 1912, and 1913) that took a heavy toll of life in the Indian bazaar (leading to its deliberate destruction by fire on at least one occation). The need to combat the malarial mosquito was also made clear after the first administrator, Sir John Ainsworth, and his infant son were both stricken with malaria (Maxon 1980, 100–2). Putting into practice what the colonial administrators viewed as correct principles of town planning proved, however, to be very difficult, as the railway authorities controlled much of the land at the centre of Nairobi and resented any kind of interference from Colonial Office bureaucrats.

As maps of the early settlement of Nairobi reveal (see Map 1), the residences of the colonial and railway administrative personnel and their families were well separated in both lateral distance and elevation from the crowded and unsanitary hovels of the Indian bazaar, the encampment of Sudanese mercenaries at Kibera (near the present site of the Nairobi dam), and from the local African settlements in the region. The nearest of these was the village of Pangani, on the south bank of the Mathare River. Other peri-urban settlements such as Maskini, on Muranga Road, Mombasa village, and Kileleshwa to the northwest of Nairobi attracted large numbers Africans as Nairobi expanded its influence (van Zwanenberg 1972, 27).

The rapid expansion of African peri-urban settlement was a cause of concern for successive administrators. In 1921 the colonial administration ordered that the "squatter settlements," including Mombasa village and Maskini, be destroyed and their inhabitants who had jobs in the city relocated in Pumwani, a "controlled" (i.e., authorized) settlement whose Kiswahili name means "a place to rest and catch one's breath" (van Zwanenberg 1972, 31). The village of Pangani, which predated Nairobi, was demolished in 1938 after much procrastination and its inhabitants scattered to the "controlled native location" of Shauri Moyo (roughly translated from the Kiswahili as "Hobson's choice," since its development on part of the Pangani site was imposed on the local Africans: Smart 1950, 46), the city council housing estates developed around Pumwani and Kariokor, and to other, uncontrolled, settlements in Mathare Valley (Hake 1977, 50). Later, controlled and uncontrolled African housing developments occupied Ziwani, Starehe, Muthurwa, Kaloleni, and Makongeni, to the north of the railway line. Some controlled African housing areas were built along the lines of bachelor dormitories at high densities, with shared ablution facilities that were scarcely adequate. Others featured rondavels with tiny, spartan sleeping cubicles for workers. Minimal washing and kitchen facilities and lack of furnishings forced residents to live outdoors and often to sleep in shifts in the cramped dwellings nicknamed "kunguni" (bedbug) housing. These dwellings were nevertheless superior to the hovels of waste cardboard, tin, and plastic in the squatter settlements of Mathare Valley, "Kitui village," and elsewhere that mushroomed in the post-colonial period.

The first permanent European residences in Nairobi occupied "the Hill," to the north and west of the railway yards and what is now the city centre (Map 1). Later, "white" residential areas extended to

Lavington and Thompson Estate on the west, Spring Valley, Westlands, and Muthaiga on the north, and to the former Blixen coffee estate at Karen and Langata, on the southwest (Map 2). The main railway line to Uganda, in the early years, ran between the European and Asian residential districts, putting the non-European areas literally on the "other side of the tracks." The Asian areas around Nairobi South and Eastleigh that were rebuilt, expanded, and improved after the First World War represented an intermediate level between the European and African residential standards.

Building materials in the new settlement were mostly corrugated iron, grass thatch, discarded wood and metal sheeting, and mud and wattle in the non-European parts of Nairobi, while hand-hewn blocks of trachyte tuff, terracotta roofing tiles, and terrazzo floors were favoured by the white administrators and settlers for their houses and offices. The voracious termites and other insect-borers of the region ensured that wood was little used as a building material in the early years, unless it was mangrove wood which is too salty to be palatable to termites.

ATTEMPTS AT OPEN SPACE PLANNING

For the first thirty years the city grew rather haphazardly, without an overall master plan. But plentiful open spaces remained, carefully maintained by the European settlers as a *cordon sanitaire* between themselves and the non-white (Indian and African) population, and by the railways as building space in reserve for possible expansion projects. There were, however, piecemeal attempts by authorities to control the growth and nature of the city, especially the suppression of undesirable aspects of growth in the Indian and native parts of the city. Such considerations formed part of the Bransby-Williams report of 1907, setting out principles for development of the city that included a new Indian bazaar and a new "native location," as well as health and sanitation provisions and controls on the influx of "undesirables" (Hake 1977, 36; Thornton White, Silberman et al. 1948, 16). Few of the provisions in this report were implemented, and outbreaks of plague continued in the chaotically expanding settlement.

In 1913 W.J. Simpson was commissioned as an adviser to the administration, with instructions to devise adequate sanitation and health measures in the wake of the bubonic plague outbreaks (Thornton

White, Silberman et al. 1948, 39). A key aspect of his recommendations was the physical separation of non-European from European commercial establishments in addition to the existing segregation of residential areas. Again, most of his ideas were not implemented, partly because of the upheaval caused by the outbreak of hostilities with German East Africa and the desperate need of the British for support from the non-European communities in the Protectorate.

Until 1919 no planned or formally designated African residential location existed in Nairobi (ibid., 16), and no housing for African workers had been constructed by the government, despite their increasing numbers in the city. In 1923 the East African Railways alone employed over 11,500 Africans as artisans, clerks, and labourers in their workshops (Hill 1949, 442). The peri-urban settlements housing many of these African workers and others were unplanned and, as we have seen, considered undesirable by the colonial authorities. When the First World War ended, however, large numbers of Africans who had been conscripted into the army's carrier corps during the campaign against German East Africa required resettling. As a gesture of gratitude, the government constructed a residential housing estate for these men, called appropriately "Kariokor," which boasted planning features that made it, in the eyes of the Europeans, a model settlement for Africans. Plentiful open space was not, however, one of its notable features.

Some years later, at a time when other British colonies were developing ambitious urban plans along "garden city" lines, F. Walton Jameson and Herbert Baker submitted a plan that was considered by the local government commission in 1927. It recommended, inter alia, realignment of the railway and strict pass laws to curtail the influx of Africans into the city. Some, but not all, of its provisions were accepted and implemented. Still lacking the benefits of a truly comprehensive master plan, however, the segregated city continued to grow. But though it dealt in a piecemeal fashion with land-use problems, it still retained its generous zones of no man's land between its various segments.

Further tracts of open space in the city were provided by the vigorous anti-malarial activities of the colonial administration. Twelve-foot minimum-width way-leaves along the banks of all streams and drainage lines were left free of buildings to permit spraying of mosquito larvae and clearing of the dense brush that harboured adult mosquitoes. The Nairobi swamp and other low-lying areas were

drained and canalized. In the European residential suburbs, houses were often sited hundreds of metres away from swampy or riverine flatlands, high on the trachyte ridges at a supposedly safe distance from those suspected "carriers of malaria," the children of the Asians and Africans.

Even on the trachytic red loams of the first Kikuyu escarpment, however, poor soil drainage necessitated wide spacing of European houses whose sanitary facilities featured pit latrines in the early years and later septic tank systems that required extensive diffusion beds. Colonial European residences, sporting clubs, and other facilities were thus of necessity constructed at low density, and came to be surrounded by spacious and ornate gardens and lawns that are a feature of the upper-income areas of Nairobi even today.

A second reason for the wide spacing of European housing suggested by Frenkel and Western (1988, 219) pertains to the native domestic servants in the European residential suburbs. African and Asian "houseboys" living in servants' quarters on the European estates were sufficiently separated from each other that they did not constitute a viable pool of infected individuals. At that time such a pool was thought to be a prerequisite for the transmission of malaria. Being mostly single males, or at any rate not living with their families, they did not have children in their living quarters, and thus there was no danger of these putatively highly infective individuals being brought into close contact with Europeans. This may also explain the reluctance of colonial authorities to permit African women any sort of residence in the urban centres, whether permanent or temporary. Women, sooner or later, produce children, and these were not wanted in the city.

Supplying such far-flung, low-density residences with an adequate supply of safe water was an enormous expense for a small colonial city, located in an area prone to droughts and with an annual mean evaporation rate of 193 centimetres a year. Lower-income areas, as might be suspected, have never been satisfactorily supplied with water. Reservoirs, treatment plants, and pipelines were intended primarily for the upper-income residents. Buffer zones around reservoirs such as the Nairobi dam have, nevertheless, added to the open space in the urban area, and in recent years have proven ideal for urban cultivation.

Additional space in Nairobi and other Kenyan towns was to be found in the system of roads and rights of way. Main roads in the

unplanned settlement of Nairobi, even from the earliest years, were extremely wide as a result of Governor Ainsworth's insistence (as chairman of the town committee) that they be broad enough to permit the turning of a wagon pulled by a full span of oxen (Hake 1977, 27). Tracks and roads were at first rough and rutted, and quickly became quagmires in the rainy seasons before being surfaced first with "murram" gravel, later with tarmac. Deep stone or concrete gutters were constructed along roads in the city to carry away the runoff from torrential rains that still regularly cause local flooding of parts of the city and suburbs.

A concomitant of the sprawling nature of Nairobi was that no effective system of public transportation could be implemented in the early years. The private motor car became the means of transportation for the majority of white residents of Nairobi almost from the earliest times (Hake 1977, 28). Non-Europeans either used donkey or ox carts, or walked, carrying their burdens on their heads. Few Africans in the early settlement could afford bicycles, and an effective bus system was a long time in coming to the city.

4 Open Space in the "City Beautiful": Nairobi as a Modern, Planned Capital

Nairobi became a municipality in 1919, with a municipal corporation empowered to make by-laws concerning the "safety, health and well-being of its inhabitants" (Thornton White, Silberman et al. 1948, 17). It gained city status in 1950. Early efforts by the municipality to implement the formal land-use planning and zoning recommendations of various reports and recommendations, from Bransby-Williams, to Simpson, to Walton Jameson, however, foundered on the rocks of disinterest or opposition from the powerful railway administration and other groups, such as the mostly Asian merchants. Also, the European suburb of Muthaiga had proclaimed itself a separate township in 1923 and resisted amalgamation with Nairobi. This move, which rendered comprehensive planning very difficult, was in reaction to a new British government policy statement on racial segregation introduced in 1923, which expressly rejected the idea of segregating Indians from Europeans. This paper, which in some respects was a complete about-face from previous colonial office directives, did not, however, say anything concrete about the *de facto* segregation of Africans.

The continuing lack of land-use zoning controls in Nairobi, meanwhile, had resulted in the division and subdivision of freehold parcels of land in the town to produce extreme overcrowding of buildings in the Asian areas. These plots were free of any restrictions or conditions regarding the type or standard of buildings constructed on them. The years of the great depression, followed by the Second

World War, saw questions of planning in Nairobi, and any ambitions of building a model "garden city" in Kenya, pushed aside as more vital concerns were dealt with. During this time, haphazard development continued.

THE 1948 NAIROBI PLAN

In 1948, however, the colonial government unveiled a plan which was to have far-reaching effects on the development of Nairobi, the preservation of its abundant open spaces, and thus the supply of vacant lands for use by the informal sector in recent decades. This ambitious and truly comprehensive urban plan, the work of a team of South African and British planners headed by Thornton White, Silberman, and Anderson, explains a great deal about the way in which informal urban agriculture has arisen in the city of Nairobi.

The authors of the plan describe the 1948 city of 100,000 people as "a far flung, sparsely populated, and open-air place" (Thornton White, Silberman et al. 1948, 2). In their view, Nairobi had developed a seven-district spatial structure as early as 1906. Moving from the plains to the uplands, these seven districts were:

1 The railway centre
2 The Indian bazaar
3 The European business/administrative centre
4 The railway workers' quarters
5 The "dhobi" (washerfolk) quarters
6 The European residential suburbs
7 The military barracks (on Langata Road)

The authors of the 1948 plan laud the "large estates, pleasantly spacious suburbs, and plentiful public open space" (ibid., 3). Noting that noxious and heavy industries were situated in the extreme southeast of the urban area, where prevailing winds kept all polluting effluent gases well away from the rest of the city, they confide to the reader that "preservation" of the "pleasures" afforded by open spaces and parks in the city may require further industrial decentralization (ibid., 3). They refer to the role of the railways in shaping Nairobi's development, calling this the "Nairobi problem" since, as they acknowledge, most of the railway facilities cannot be relocated away from the city centre in the interests of aesthetic planning (ibid., 2).

A second major problem to which they allude is the chaotic and haphazard arrangement of residential and commercial subdivisions and attendant land-use incongruities in parts of the city. This, they assert, resulted from previous failure to control freehold occupation and use, which had been left entirely to individual landowners. Seemingly, the only apparent motive of the latter was to maximize profits, their guiding principle being: "The more crowded the built up part of [their] plots, the more valuable the remaining unoccupied part" (ibid., 16). They note, however, that "the town has no intricate slum clearance problem [permanent residences of Africans had been largely excluded from this colonial city, and the Asian bazaar had been moved and rebuilt along lines more acceptable to European administrators] ... Its open spaces are more than adequate; sufficient land remains in the hands of the public authorities ... essentially, therefore, the Nairobi Plan will be a zoning plan" (ibid., 3).

The land-use plan they produced featured many of the most up-to-date principles of the Garden City concept of Ebenezer Howard: the segregation of residential from commercial and industrial land; the use of the neighbourhood principle to separate purely local interaction from arterial traffic; the aesthetic as well as functional conversion of main roads into wide boulevards with grassed medians and generous verges; landscaped traffic roundabouts as well as broad, grassy way-leaves along streams (e.g., the Nairobi, Mathare, Masongawai, and Ngong rivers) and other drainage lines through the city; and large areas of parkland and forest reserve. Zoning of residential areas featured a half-acre minimum lot size in European areas with septic systems for effluent disposal (in actuality, lot sizes were a minimum of one acre per house in areas such as Lavington, Muthaiga, Upper Parklands, and Upper Hill estates) to a density of twelve houses per acre in the African areas of Pumwani and Pangani.

Some African estates were constructed along "neighbourhood unit" lines, following the major plan concept (Walmsley 1957, 31). These included Bahati, Ofafa and Mbotela on the south side of the Thika railway line, each designed originally to house about seven thousand people, and each with its own market, dukas, school, dispensary, playing field, and beer hall. In the decades since their construction, the population of these areas has more than tripled. Pumwani, for example, already had a population of thirty thousand

people in 1971, at a density of 153 persons per acre (Muiu 1971, 6). The original, orderly arrangement of dwellings and communal ablution facilities has long since been obliterated by infilling of squatter dwellings on any available open space. Parts of Mathare Valley in 1987 resembled a cardboard city, its teeming squatter population living in unnerving squalor.

The 1948 Nairobi plan showed a relatively enlightened viewpoint (for that time) towards the integration of the multi-racial elements in the city. This appears to follow the official British colonial policy dating from 1923 which seemed, nevertheless, to have been previously honoured in the breach rather than in the observance: European home owners and real estate agents continued to practise *de facto* discrimination in spite of official integrative policies (Walmsley 1957, 34). The 1948 plan was flying in the face of previous practices in most colonial cities, therefore, by attempting to ensure that Asians were not segregated en masse from Europeans in future residential and commercial planning. The intent of the plan was frustrated, in any case, as an economic class mechanism had begun to operate in the city in addition to racial real estate practices, and thus *de facto* segregation was perpetuated (Lowder 1986, 91).

The authors of the plan also considered the position of Africans in the city, talking positively about planning for a "stable" indigenous population (for example in the suburb of Eastlands), indicating that they envisaged the elimination of the circular migratory pattern of the Africans. There is the suggestion, however, that only small numbers of Africans would be catered for, and these would remain in their allotted roles as menial workers attached to European residences or businesses. This failure of the plan to accommodate larger numbers of Africans is, without doubt, a root cause of many of the contemporary problems of Nairobi.

Interestingly, the authors did not seem at all opposed to the idea of horticulture within the city, judging from the tenor of the following observations:

> In the area encompassed by Ngara Road, Market Road and Government Road lay the Nairobi swamp, at first thickly covered with papyrus but later on cleared for vegetable gardens which were well kept from the beginning ... some parts of the park [reserves in planned residential districts] might well be set aside for use as allotments for vegetable growing, the additional area of ground being gained by a slightly closer net density of housing

where the amenity of allotments is available (Thornton White, Silberman et al. 1948, 14, 66).

They reject, however, the idea of servicing vegetable plots in the city, bowing to the economic realities of colonial Nairobi: "Land values and the difficulties of piped water supply make it impossible to provide separate plots for each dwelling where crops can be grown" (ibid., 37).

The plan follows earlier practices aimed at preserving a healthy environment for Europeans in the city: "River valleys should be reserved as open space because they are useful as drainage lines. The existing 12 ft. wayleaves for malarial control may prove, in many cases, inadequate as the areas are built up and the run-off increases" (ibid., 66).

The 1948 plan devotes an entire chapter to the planning of open spaces in Nairobi. It states: "'open spaces' in the sense a town planner uses it here, means more than the preservation of tracks [*sic*] of land for vegetation, and the prevention of house building and the spread of industry. It means the conscious treatment of that preserved space, its landscaping and utilization for enjoyment. What can be done with Open Space has been shown by many peoples and civilizations, each giving expression to a vital part of themselves, indeed contributing to that civilization and summarizing it to others" (ibid., 54).

The fold-out map in the master plan is dominated by strips of parkland and open space averaging three hundred metres in width that transsect the city area, following all major watercourses from the Kikuyu land unit on the west to the "green belt" on the east. Forest reserves border the planned city on the north (the Karura reserve) and south (the Nairobi game reserve, now the National Park). The forerunners of the present Waiyaki Way, Ngong Road, Thika Road, and St. Austins Road are shown on the plan as broad boulevards with roundabouts. As we have seen, their plans were aided to some extent by the foresight of Governor John Ainsworth and the fortuitous availability of open space in the (as yet unused) railway lands near the centre of the city.

The overall concept aimed to produce an inner green belt around the central business district, with green "avenues" radiating out to the municipal boundaries. As the plan comments: "It is not necessary that these radial green avenues should all be in public ownership but it is necessary that they be under the control of public

authorities and that building lines well set back from rivers are instituted in the same way as building lines are fixed relative to roadways" (ibid., 66).

Given the emphasis on preserving open spaces and the pleasant "roominess" of the city, the plan is somewhat contradictory in its stated objective of achieving "consolidation and compactness" (ibid., 54). In fact, the provisions in the plan call for 28.7 per cent of the total pre-1964 city area to be preserved as open space (ibid., 66).

The mark of the 1948 master plan for Nairobi can clearly be seen today in the layout of the city and its suburbs. During the decade and a half between the publication of the plan and the attainment of Kenyan independence, many of the provisions of the plan were put into effect, particularly those relating to the preservation of open space and the development of wide boulevards and fine landscaped grounds around public buildings. In particular, as a concomitant of this plan, much of the vacated railway land became part of a park and boulevard system that remains an aesthetically attractive feature of Nairobi to this day. This includes Uhuru Highway (originally known as Princess Elizabeth Way when it was opened in 1952), a wide, dual-carriage road with a grassed median and verges planted with rainbow-hued bougainvillea. This axial highway intersects major crossroads such as Haile Selassie Avenue, Kenyatta Avenue, and University Way at broad, landscaped roundabouts. Spacious parklands adjoin this highway, notably Uhuru Park with its artificial lake and well-tended gardens, Central Park, near the Serena tourist hotel, the university sports grounds, the arboretum, and the park-like grounds of the Railway Club.

A boulevard following the south bank of the Nairobi River, designed to divert traffic around the central business district, was marked on the 1948 master plan, but its construction only commenced in 1987. This road threatens to destroy some of the most productive and densely cultivated urban shamba land in the inner city area.

Other important aspects of the plan were shelved during the 1950s as the colonial regime fought the Mau Mau rebellion. One of the anti-insurgency measures was the expelling of most Kikuyu from Nairobi and their relocation in fortified villages, significantly changing the ethnic composition of the city for several decades. Other African groups in the city, regarded as trustworthy by the British, were favoured during this period – for instance the Sudanese, living

in the settlement of Kibera (Lowder 1986, 146). These favoured groups were allowed to purchase land in the city for the first time (ibid., 92). In the early 1960s, bowing to the "winds of change" in Africa, the British made ready to depart, and remaining aspects of the plan were left to a post-colonial administration to implement.

Inevitably, a number of the open areas created or preserved under the plan have attracted increasing informal sector activities over the last few years. Some of this has been ephemeral, as, for example, the squatter housing that sprang up on vacant land opposite Kenyatta Hospital in the late 1970s, but which has now given way to neat rows of middle-income townhouses. There has been, in other words, an evolution towards "formal" land uses in some parts of the city. In other places, however, the reverse has happened, as areas that were previously "formal," such as the shops and homes along part of Muranga Road near the Mathare Valley crossing (see Map 2), have deteriorated physically and experienced infilling by temporary structures typical of jua kali enterprises. Thus the dividing lines between upper and lower income, formal and informal, and African and non-African sectors of the city have become blurred over the past several decades.

NAIROBI SINCE INDEPENDENCE: OPEN SPACE PLANNING AND USE

As whites left Kenya around the time of independence, Asians and a newly emerging African upper class, often foreign-educated and with sophisticated tastes and lifestyles, took their place. The maxims of good planning in the colonial years were simply taken over and continued by the new élites, who also adopted habits of conspicuous consumption, preferring, for example, to drive imported automobiles rather than support public transport, and to live in ground-gobbling mansions in the former European suburbs or on recently cleared coffee lands in the red soil uplands. Thus, the upper-income areas, with residential densities of less than three thousand persons a square kilometre, continued their inexorable expansion across Loresho Ridge, Bernard Estate, and in the vicinity of the new United Nations Environmental Secretariat, built on coffee lands near the Karura Forest (Map 2).

An elected city council, headed by a mayor, administered Nairobi from independence in 1963 until 1983, when a management crisis

led to its suspension by the government and its replacement by an appointed commission. In attempting to keep to the master land-use plan at a time of rapid economic and physical expansion in Nairobi, however, today's City Commission Planning Department confronts serious problems that are partly a legacy of colonial days, partly a consequence of the very rapid growth of the urban population and the concomitant demand for land, and partly a result of a fear that relaxation of their vigorous efforts to enforce zoning regulations may result in the sweeping away of all vestiges of orderly planning. In this regard, Nairobi is not very different from other large Third World cities (Lowder 1986, 66).

The zoning regulations currently in force in Nairobi are a direct legacy from the British colonial period, although they were modified somewhat at Kenya's independence. Around that time, the administrative boundaries of the metropolis were enlarged from roughly sixty-five square kilometres to the present 690 square kilometres, and naturally enveloped and incorporated many areas that were occupied by farmland. Even today, working farms over eight hectares are regarded as legal within the city area, but any other form of cultivation on public *or* private land is prohibited by the City Commission. Such prohibition is based on the Local Government Act, Cap 265, the Public Health Act, Cap 242, and City of Nairobi By-Law I.N. 275/1961, all of which can be interpreted as severely restricting cultivation in urban areas (Mazingira 1987, Annex 7,1).

Planning by the City Commission covers the entire Nairobi extra-provincial district, including a forty-kilometre-wide zone outside the present boundaries of the city. Land-use zoning ideals aim to avoid mixed-use areas wherever possible, failing which the secondary use should be kept to less than 20 per cent of the primary, whether the latter be residential, commercial, industrial, or recreational.

Published by-laws drawn up by successive city councils in the past are used by the present City Commission as guidelines against which policies and controls are adapted and applied to any formal land-use proposals by developers on a case-by-case basis (Mr Kibinda, Planning Section, Nairobi City Commission, personal communication, June 1987). Provisions for open space planning, therefore, are in practice rather ad hoc, comprising broad, unwritten stipulations that must be adhered to by developers who apply to the City Commission for approval of building schemes. Thus, developers of urban land must, as a condition for obtaining approval for their proposed pro-

jects, leave a riparian way along drainage lines and natural watercourses (three metres for a small drain, up to thirty metres if the area is prone to flooding). These riparian ways may still be considered private property if not expressly taken over by the City Commission, and can be landscaped up to the approach boundaries. But they cannot be built upon, and are subject to direction by government as to their use. The concern of the City Commission is to preserve these riparian ways for flood mitigation and city beautification. They are, however, no longer part of any specific malarial control scheme. Use of these way-leaves by informal sector activities, either of the jua kali or urban agricultural kinds, would certainly impede such anti-malarial schemes if (as some medical authorities believe) it becomes necessary to reinstitute spraying and brush clearing in the future to control a resurgence of malaria in Nairobi. In one important open area, the green buffer zone around the Nairobi dam from which part of the city's water supply is drawn, encroachment by tenement "overspill" housing from nearby Kibera (formerly a settlement for Sudanese mercenaries and their families but now multi-ethnic) must surely constitute a threat to the safety of the drinking water supply.

Developers wishing approval of new building projects are required to satisfy City Commission regulations as regards other public or private easements, which are classified according to width, e.g., nine metres (most side streets), twelve, fifteen metres (collector roads in subdivisions), eighteen, twenty, twenty-five, thirty metres (utility easements and major urban roads) and sixty metres (trunk roads, which incorporate verges of twenty metres on each side). The City Commission holds that private developers have a responsibility to ensure that easements and other urban lands conform to the original planned use, and requires them to set aside 10 per cent of developed land for public open space in projects covering a hectare or larger (Mr Kibinda, personal communication, June 1987). Much of these vacant lands are unkempt and covered with coarse grasses or brush, or else are in use by urban cultivators – for example, in the housing estates of Southlands, Moi Estate, Bellevue, and Plainsview Estates on the north and east sides of the Nairobi National Park.

After a past history of active discouragement of informal sector activities of any kind in Nairobi the City Commission now adopts a somewhat more tolerant viewpoint regarding some of these activities under certain circumstances, yet still vigorously discourages others. A Temporary Occupation Licence (TOL) may be granted to jua kali

open-air informal manufacturing or commercial activities in Nairobi, provided they do not encroach on road reserves or occupy land scheduled for immediate development. Similar TOL privileges may be obtained for grazing livestock on the outskirts of the city. The granting of TOL privileges is intended to ensure that an informal business will not be harassed or required to surrender the land on which it operates without a formal notice of intention to resume the land, issued ahead of time by the City Commission. No such privileges, however, are accorded to urban agriculture anywhere in Nairobi, since such activities are not considered as *bona fide* urban land uses (Mr Kibinda, personal communication, July 1987). The City Commission has chosen to adhere closely to a particular provision in the Local Government Act, giving it the power to "prohibit cultivation by unauthorized persons of any unenclosed and unoccupied land in private ownership and of any Government land and land reserved for any public road" (Mazingira 1987, Annex 7, 1).

In the actual enforcement of its by-laws and regulations regarding urban cultivation, however, the City Commission displays some ambivalence towards this sector. It now ignores private backyard plots on enclosed residential ground and shambas of ground-hugging food crops on vacant land, provided no crops are planted that will exceed four feet in height at maturity (which obviously excludes sugar cane, bananas, cassava, pigeon peas, and that overwhelmingly important staple of the poor, maize). Tree crops, non-food crops, or crops grown explicitly for cash sale (such as coffee) are not tolerated within the city. In fact, unlicensed growers of coffee can be prosecuted under a national law (the Coffee Ordinance). Similar penalties exist for other controlled cash crops.

In view of the importance of maize in the local diet, and bearing in mind that it is one of the few foods that can be stored for dry-season consumption by the urban poor (and is therefore the basis for many jua kali enterprises including food kiosks and sidewalk maize-roasters), it is not surprising that the regulation prohibiting its cultivation is widely ignored. Certainly, a casual visit to almost any part of the city during the rainy season will reveal numerous plots of healthy maize growing by the roadside without any attempt by their owners at concealment. The City Commission wages war on maize plots within the city, however, by issuing orders to landowners to clear the land or by sending bands of askaris to destroy the offending food crops if they occupy public land. There is a provision in the

regulations for a fine as an added penalty for illegal cultivation of any crop exceeding the unofficial four-foot maximum, but whether this deterrent has been used frequently is uncertain. In mid-1987 there was no indication that these official attitudes towards urban agriculture were likely to undergo any ameliorating change; in fact, the policy of vigorous discouragement by local government officials seems set to continue in Nairobi and throughout the rest of urban Kenya.

There are, indeed, upper-income Kenyans and members of the expatriate business and diplomatic communities in Nairobi who view the entire informal sector as an unsightly and embarrassing blot on the urban landscape – a continuous but unwelcome reminder that programs for development and efforts to project an aura of modernity and progress have not reached very far below the surface. Government and City Commission officials at times appear to act as rather enthusiastic agents for this minority group, and their crackdowns on unsightly jua kali enterprises and urban shambas intensify when major international conferences in the city bring in large numbers of foreign visitors. Defenders of the informal sector complain that projecting an illusion of a modern, sophisticated city appears more important to some officials than dealing seriously with the gritty realities that force so many urban residents to live in poverty. As one Kenyan parliamentarian observed some years ago: "Do you hide your disabled child because a visitor is coming?" (Mr Charles Rubia, MP for Starehe, quoted in *Daily Nation*, Monday 15 June 1987, 3).

Despite official disapproval, however, informal cultivation of open spaces in Nairobi is clearly on the increase with every passing year. This, too, is scarcely surprising in view of the findings of the Mazingira Institute's Food and Fuel Study that over half the households surveyed in the city in 1985 were unable to feed themselves satisfactorily on what they currently earned (Mazingira Annex 6, 1987, 62), that 16 per cent of households had grossly inadequate food supplies, and 7 per cent of children showed signs of malnutrition (ibid., 10). These are all strong arguments for persuading officials to change their anachronistic views towards urban agriculture.

PART TWO

Kenya's Urban Farmers and their Gardens

The empirical analysis in Part Two is based on data obtained in two separate but complementary sample surveys of Kenyan urban agriculture. The first is the Mazingira Institute's Kenya Urban Food and Fuel Study, covering production and consumption practices in selected households in six Kenyan municipalities. The second is a survey supervised by the author under the auspices of York University, Toronto, and Kenyatta University, Nairobi, with funding from the Canadian Social Sciences and Humanities Research Council, which focused on informal urban agriculture in the open spaces of Nairobi. This questionnaire survey was aimed at active cultivators rather than heads of households as in the case of the Mazingira survey. Basic reports of both surveys were completed in 1987.

The Mazingira study was the more broad-ranging of the two surveys, examining household characteristics, household subsistence production and consumption of crops, livestock, and various fuels, notably wood and charcoal ("households" being defined in accordance with the 1980 Central Bureau of Statistics definition). Field data were collected by a team from the Mazingira Research Institute, Nairobi, from October 1984 to July 1985, with financial support from the Canadian International Development Research Centre. Six towns and cities were selected as representative of the urban milieu in various agro-climatic zones of Kenya. These were Isiolo, Kakamega, Kisumu, Kitui, Mombasa, and Nairobi. The actual sample size for all households in the six urban areas was 1,576.

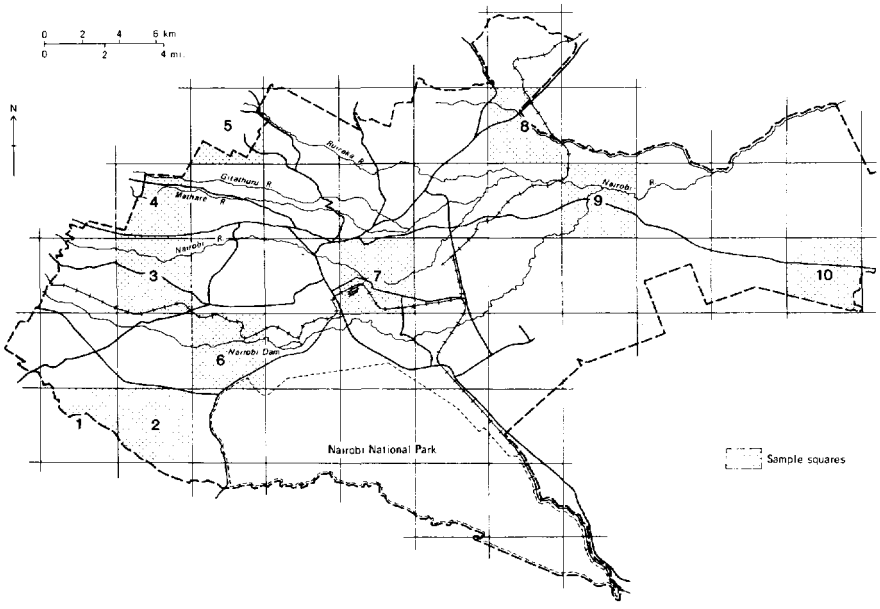
The York–Kenyatta University survey of urban open space cultivation was conducted from mid-May to early July 1987, a period during the

annual long rains when cultivators are active in their fields and gardens. The study area was the extra-provincial district of Nairobi, an area of 690 square kilometres currently administered by the Nairobi City Commission. The principal survey instrument was a questionnaire administered to selected cultivators in ten sample areas (Map 3). Cultivators were interviewed as they worked in their fields. Questions covered selected aspects of personal backgrounds/household characteristics, tenure/usufruct arrangements, cultivation practices, protection and disposal of the crop, and site characteristics. Drafted in English, and approved by York University's Committee on Ethics in Research on Human Subjects, the questionnaire was translated by the research team into the local vernacular (Kiswahili, and Kikuyu in some cases).

Care was taken to ensure that the questions were translated in a standard and unambiguous way to achieve accuracy and comparability of answers when administered in face-to-face interviews. A pilot survey, followed by several months of field interviewing, was carried out by a team of Kenyan students, selected from a list supplied by the chairman of Geography at Kenyatta University and trained in interview techniques by the author. In addition to the questions on the questionnaire, interviewers were encouraged to set down additional observations and relevant facts gleaned during the interviews.

The survey produced 618 completed questionnaires. There were very few "blanket" refusals or incomplete questionnaires (except in one area, where one male interviewer reported that a number of women in the fields fled at his approach; we later learned that there had been several unsolved murders in that area in recent months). In part of the inner city along the south bank of the Nairobi River, construction work was commencing on a road bypassing the central business district, and a number of shambas had been destroyed or were threatened. Respondents in this area needed reassurance that the survey was in no way connected with the City Commission, which was carrying out the construction work.

Respondents were, for the most part, very willing to answer all questions on their own background and on cultivation practices. An exception, however, was the question on family income, which about one-quarter of all respondents refused to divulge. Traditionally, income is a matter for the male head of household, and is not usually discussed either with or by womenfolk. Thus, in a large number of cases, women respondents were reluctant to discuss it, and male respondents chose not to disclose it to female survey members. On the other hand there was no reluctance to give information on household expenditures for food and other necessities, and



Map 3. The 1987 York–Kenyatta University survey: sample squares for cultivator interviews

both men and women seemed to have a good knowledge of expenditure details.

The author met with the entire team of interviewers each day to gather and check completed interviews and resolve practical difficulties associated with the survey. Computer coding and analysis of the questionnaire data by the author commenced in May 1987 and continued until August 1988. Further details of the technical aspects of this survey are given in Appendix 1. Complementing the analysis in the following chapters are detailed statistical tables comprising quantitative results of the surveys. These are presented in Appendix 2.

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5 Urban Food Production and Consumption in Six Kenyan Municipalities

The Mazingira Institute survey of urban food and fuel production, distribution, and consumption in Kenyan households covered six towns and cities, reaching 1,576 households that together contained 9,043 members. The chosen municipalities were Isiolo, Kakamega, Kisumu, Kitui, Mombasa, and Nairobi. Kitui was the only town that had a population under ten thousand at the national census of 1979. The populations of the sampled towns and cities are shown in Table 1.

Of the sampled households in these six urban centres, 455 grew food on urban lands or both urban and rural lands. The rest either bought their food or produced some food on rural lands to which they had access. Frequencies of respondents among the sampled municipalities varied from thirty-nine in Kisumu town to 154 in Nairobi.

Summary data on household food production and consumption have been collated from the 1987 Report of the Mazingira Institute (see Table 1). They serve to describe the broader scene of urban agriculture in Kenya against which the more focused information on the Nairobi situation can be evaluated and compared. This chapter considers some of the implications of these data from the Mazingira study, especially as they have bearing on specific results of the York–Kenyatta University survey of agriculture in the open spaces of Nairobi.

Nairobi has the smallest mean household size of the six urban areas

(5.4 persons as against 5.7 for all six centres), but is around the average as regards the percentage of confirmed permanent residents (86 per cent) and gender balance (49 per cent male). Only Isiolo, a town on the northern agricultural/pastoral frontier, has a slight predominance of males. The colonial pattern of Kenyan urban centres, when they were mostly male bastions, seems to have been greatly altered since independence. About 11 per cent of Nairobi households are headed by females, compared with 14 per cent for the six centres taken together.

The populations of all urban centres are youthful: only Nairobi has over half its population in the "working age" group of fifteen years and over. Nairobi's population is somewhat better educated than other centres, with a lower percentage of residents lacking any formal education. It is noteworthy, however, that the average proportion of uneducated urbanites for all six centres is a full one-third of the population. The number listed as unemployed is low by international standards, averaging 10 per cent, and with the drought-prone frontier towns of Kitui and Isiolo topping the list at 15 per cent. As we have noted earlier, however, unemployment as the western world knows it is a luxury that the poor in Third World nations cannot afford, and most would be better classified as "invisibly underemployed," to use the ILO's term for those working long hours for insufficient remuneration.

Nairobi has close to the average proportion of the population engaged in growing crops and keeping livestock. Nearly one person in three grows crops, and one in five keeps livestock. All of Kenya's urban areas, therefore, are to a considerable extent "cities of farmers." Nairobi has a higher than average median income, being exceeded only by Mombasa, and yet it has an above average number of households that suffer from inadequate food supplies. As the Mazingira study points out, however, an urban family needs about eight times the cash income of a rural family to maintain the same relative standards of living, since rural households may produce all their own food, while most food must be purchased in an urban area, and urban families most probably must pay rent for their accommodation. Nairobi has the lowest proportion of households growing food exclusively in the urban area itself, but is close to the average (65 per cent) as regards households producing food from lands in rural as well as urban areas. This, presumably, is because so many urban residents have some claim on family lands in the home regions of

rural Kenya from which they have migrated over the past decade or so.

The Mazingira study found that the median size of shamba plots was extremely small (only fifteen square metres). There was broad variation in average size of plot among the six municipalities, however, with Nairobi being the smallest at thirteen square metres. This is dramatically lower than the average found in the author's survey. This is probably because the Mazingira study, by concentrating on households rather than active cultivators in urban open spaces, discovered a high proportion of very small backyard garden plots in enclosed urban or suburban residential properties (see Table 2), whereas the author's survey focused on shambas in vacant or open lands in the city that were not in the "backyard vegetable plot" category. No *a priori* minimum size of vegetable plots was stipulated for the author's survey, however. As regards length of time that the plots have been cultivated continuously, there is broad agreement between the two surveys and low variation among the six urban centres, with about one-third of all households cultivating for five years or longer. Again, Nairobi is the lowest of the six, with just over one-fifth cultivating for this length of time. Also, Nairobi has a lower than average proportion of plots on land owned by the household head or a family member, and the highest proportion on land owned by the municipality (Table 3). It is noteworthy that, in all six urban centres, the respondents to the Mazingira survey said in most cases that they had acquired the land "for free" (Table 4). As will be detailed later, there is really no rental market for agricultural land in urban Kenya (or in rural Kenya, for that matter).

On average, about one-fifth of all urban food-producing households offer some or all of their crops for sale, and Nairobi is close to the average (tables 1, 5). Again, the proportion replying that they have had some crops stolen is curiously lower for Nairobi than for most other cities, but is not out of line with the proportion recorded in the author's survey. The highest by far is 44 per cent for Kisumu town in Western Kenya (Table 1). Nairobi is below average as regards the hiring of labour to help with cultivation, and also as regards the incidence of harassment of urban cultivators by authorities (these would both relate to the mainly "backyard" level of most urban shambas in the Mazingira survey).

Nairobi has the highest proportion (62 per cent) of food-growing households making use of female labour inputs (tables 1, 6). This is

still somewhat less than the 66 per cent discovered in the author's survey. The difference here may be due to the fact that, while the author's survey interviewed the (mainly female) cultivators, the Mazingira survey involved the (mainly male) heads of households, and there may have been some under-reporting of female involvement.

Maize was the predominant crop grown in all six urban centres (Table 7). The proportion of maize farming that was recorded for Nairobi (35 per cent) is much lower that the average of the six centres, and much lower also than that recorded in the author's survey. The discrepancy may, again, be due to the selection by the Mazingira survey of households with small back-garden plots, which would be less likely to grow a field crop such as maize that could not give a high enough yield from a small garden, particularly when much higher yields could be obtained from intensive cultivation of a leafy green vegetable such as sukuma wiki.

Use of fertilizer and irrigation is higher than average in Nairobi, while the keeping of livestock is just average. From this, one may infer improved knowledge and husbandry practices on the part of Nairobi's better educated population, or perhaps simply greater access to sources of cash and to suppliers of these inputs. It may also be inferred that the yield from a given area of land would be higher in Nairobi than on comparable soil types elsewhere.

The Mazingira report contains a wealth of additional information on food and fuel in Kenya's cities, of great intrinsic interest and importance, but less germane to the current discussion. In its summary, however, it points out that urban food production is both a necessity and a tradition among Kenya's urban residents, and both of these factors must be examined when trying to explain its prevalence. It says that all income groups, not just the poor, are involved in food production in the city, but obviously the urban poor predominate throuh the sheer weight of their numbers in the urban income structure. It lists the urban poor as among the groups in Kenya who are the most deprived and disadvantaged (alongside the pastoralists, smallholders, landless rural dwellers, and the handicapped). It estimates that 30 per cent of the income of the urban poor is spent on food purchases (this may be a conservative estimate).

The Mazingira report rightly points out that the urban poor are the most likely to be hard hit by rapid inflation, such as the country has

experienced over the past decade. Such inflation destroys the cash savings of the urban family, particularly since rising food costs are part of this inflationary spiral, and impels urban residents to defy local by-laws and cultivate vacant lands in order to try to feed their family.

6 City Dwellers with Farming Backgrounds: Nairobi's Urban Cultivators

There are few areas of the city of Nairobi where the activities of urban farmers cannot be observed. Even in the very heart of the central business district, between the rear of the main post office and the Catholic cathedral, the author observed and photographed in June 1987 a plot of vegetables about one-tenth of a hectare in extent. Clearly, however, some areas of the city enjoy conditions that are more conducive to urban cultivation than others, as a result of a more favourable mix of soil type, extent of public or private vacant land, absence of harassment and land-use competition, and other factors (see Appendix 1, Table 1). Broad patterns of intensity of urban agriculture emerge from an overview of the data obtained in the author's 1987 survey. Elements in these patterns, which will receive more detailed commentary below, are: (1) a dichotomy between the south-east, flat, back cotton soil area of the city and the northwest, trachytic red loam areas of the upland ridges and valleys: urban cultivators are much more numerous and prosperous in the red loam areas of the north and west; (2) nearness to streams and drainage lines: within the built-up areas, cultivators are concentrated in relatively close proximity to the streams that cut through the city; and (3) an inner city–outer suburb dichotomy: there is more scope for cultivation towards the outskirts of the city (on the north and west at least), and such cultivators are less likely to attract unwelcome attention from thieves or harassment from City Commission askaris. This dichotomy between inner city farmers and suburban cultivators will be treated

further in the next chapter, which deals with spatial variation in Nairobi's urban agriculture.

It must be noted here, however, that western models of urban structure and their age/income/status gradients and discontinuities do not apply in a straightforward way to Nairobi, which displays many characteristics of both of O'Connor's colonial city and hybrid city types (O'Connor 1983, 32–41).

No matter in which part of the city they locate their garden plots, cultivators of Nairobi's open spaces have had to choose a particular site category – for example, a plot on a roadside verge, on the banks of a river or drainage way-leave, in a park, beside a railway line, on vacant residential or industrial land, and so on. Private residential land is chosen most frequently (by about 32 per cent of respondents in the 1987 survey) with roadside verges a close second (chosen by nearly 29 per cent of respondents). Plots on river way-leaves and on other public land are chosen by about 15 or 16 per cent of respondents in each case (see Table 8). Other site categories are relatively insignificant for urban agriculture in Nairobi.

Private residential land, where it is possible to gain access to it, has the advantages of greater security and exclusivity of use, nearness to the place of residence of the cultivator, and probably nearness to a tap or standpipe for watering crops. There is likely to be less theft or animal predation. On the other hand, if the land is rented or borrowed, landlords may attach conditions to its use: for example, no maize, sugar cane, or tree crops to be grown.

Land on river floodplains has the advantage of rich alluvial silt, whose nutrients and moisture levels are replenished by occasional floods. A high water table in such areas ensures adequate moisture for such crops as nduma ("arrowroot") and sugar cane, both of which need copious amounts of soil moisture in the growing season. It has disadvantages of susceptibility to crop losses through flooding, stream bank collapse, and waterlogging of the soil. If there is inadequate flushing of the soil in such areas – a common situation during a prolonged dry period – there is a danger of toxic pollution of crops from industrial and residential effluents, especially if the farmer uses stream water for irrigation.

Roadside locations have the advantage of accessibility. This can often be a disadvantage to the cultivator as well, since any passer-by can harvest a farmer's crop. Roadside plots carry an additional hazard to cultivators who may be struck by speeding vehicles as they labour

by the roadside, and toxins such as lead may enter their crops from vehicle exhaust fumes. Similar hazards are associated with plots along railway rights of way.

DEMOGRAPHIC CHARACTERISTICS OF URBAN CULTIVATORS

Just under two-thirds (or 64.2 per cent) of the 618 survey respondents were female (Table 9). This preponderance of female cultivators is expected, and corresponds with findings of the Mazingira survey and other studies elsewhere (Sachs 1985). It would be inaccurate, however, to label urban agriculture as a sector of exclusively female employment in view of the fact that male cultivators are a significant minority and in some areas they either equal or outnumber women. Nevertheless, the role of women in urban agriculture is so important that, in order to do justice to its implications, a separate chapter (Chapter 9) is devoted to this aspect.

Of the 615 respondents who agreed to divulge their age, most appear to be in their thirties or older (the median age for the sample was thirty-eight years). Only seventeen respondents were under twenty years of age (two were as young as thirteen), and nine respondents were over seventy-five (Table 10). The age distribution points to urban residents who probably migrated to the city as young adults over the last two decades, have large families to care for, a lower level of education (that is, they attained working age before the advent in the mid-1970s of full free primary education), and/or an inability to obtain higher-paying urban jobs due to competitive disadvantages. These factors will be investigated below.

The vast majority of respondents, both male and female, were married and living in a typical nuclear family situation with their spouses and children. The survey data on family size, indeed, fit the expected image of cultivators as poor, early middle-aged urbanites with many mouths to feed. Nearly 64 per cent of respondents had four or more children (the median family has five offspring), and 6 per cent had ten or more, while only about 11 per cent were childless (Table 11). In addition to their own children, about half (49.8 per cent) of the respondents reported at least one other dependant, usually the child of a rural relative or an aged or infirm person. Fifteen per cent of the sample were supporting at least four dependants in addition to their own children. Cultivators interviewed in the author's

survey were not asked whether they were the head of the household in which they lived; it is known from the Mazingira survey that about one Nairobi household in every ten is headed by a woman, and that these comprise some of the very poorest in the city.

The statistical pattern of education of urban cultivators is bimodal. Over one-third (35.6 per cent) completed seven years of primary education (compared to a mean of 4.3 years), while more than one-quarter (28.8 per cent) had no schooling at all (Table 12). Only about one-fifth (21 per cent) of all respondents had one or more years of secondary schooling; only 63 (10.2 per cent) completed four years, while just 5 per cent of the sample had tertiary or other additional formal education (tables 13 and 14). These data place urban cultivators at the lower end of the scale of educational attainment of Nairobi residents, when data from other surveys are used for comparison. As will be seen below, women in older age groups tend to have a much lower level of education, and such women predominate among the ranks of urban cultivators.

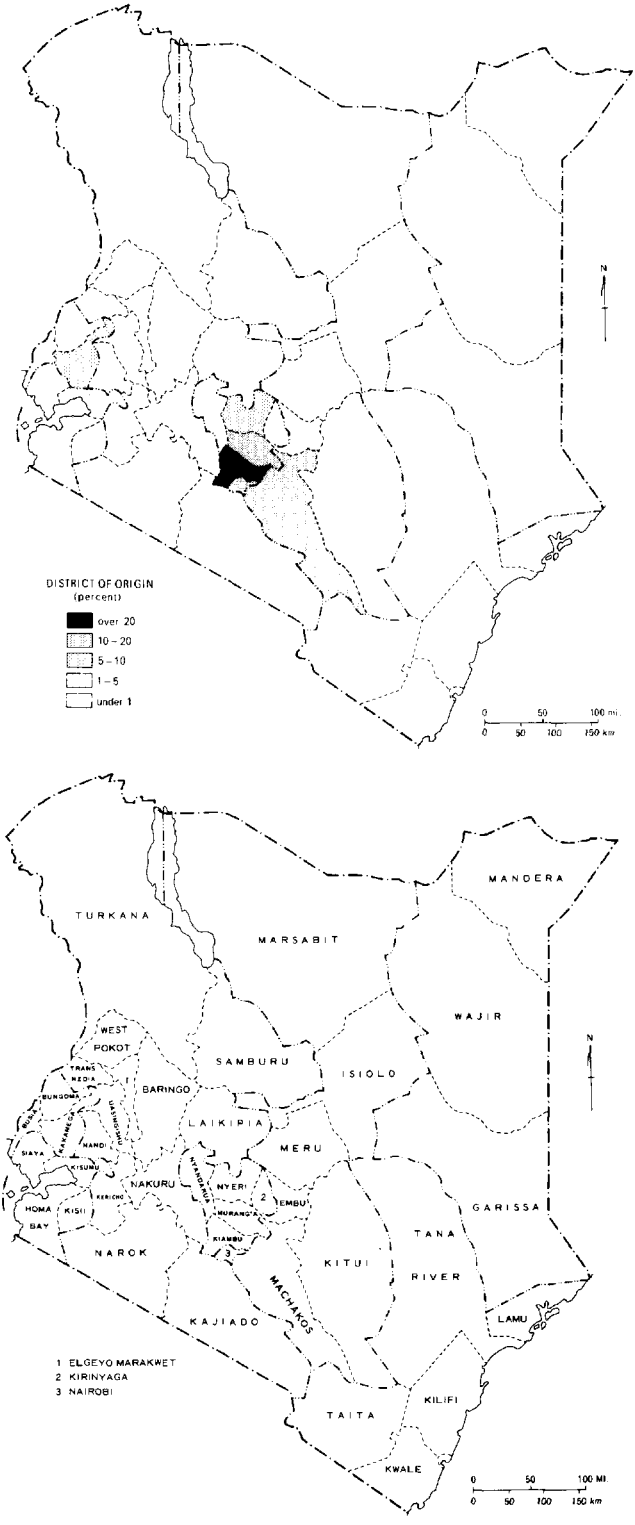
DISTRICT OF ORIGIN OF URBAN CULTIVATORS AND LENGTH OF RESIDENCE IN NAIROBI

Just over 13 per cent of the sample of 618 urban cultivators were born in Nairobi (compared with the 1979 census figure of 26 per cent for the urban population as a whole, although this included children). A percentage of respondents who listed Nairobi as their place of birth are actually still farming suburban plots of land that were classed as rural before being annexed by the expansion of the city boundaries in 1964. The majority of urban cultivators, however, are migrants from other, mostly agricultural parts of Kenya and neighbouring countries. Rural districts contiguous to Nairobi naturally supplied the bulk of these migrants (see Map 4). Kiambu, a Kikuyu area immediately north of Nairobi, leads with 23.3 per cent of respondents born within its boundaries, followed by Muranga, another Kikuyu district (14.1 per cent) and the Kamba district of Machakos, on the eastern boundary of Nairobi (12.8 per cent). Overall, the spatial pattern of migration of cultivators to Nairobi follows the conventional "distance decay" model, with most agricultural districts of the country represented to some extent among the sample of respondents. An interesting divergence from the expected pattern of decreasing numbers with

increasing distance from the capital is the larger than expected representation from the Abaluhyia district of Kakamega in western Kenya, where 9.1 per cent of respondents were born. This is undoubtedly related to the extreme population pressure on available land in the mostly peasant agricultural district of Kakamega. Western Kenya as a whole has one of the highest rates of population increase anywhere in the world (Mbithi and Barnes 1975, 84), and an out-migration of males has left it with a gender imbalance (70 to 89 males per 100 females). In contrast, there are much lower densities in estate-farming, pastoral, and smallholder areas in other parts of the country, even in districts such as Kajiado and Narok that have some high potential farm land and are relatively close to Nairobi. It should be noted, however, that the important "migrant origin" agricultural districts of Kiambu, Machakos, Meru, and Nyeri, all relatively close to the capital, are also listed by the ILO (1972) as "land short" districts, and several of these have average land holdings under two hectares each.

Relatively few migrants came in any case from pastoral areas of the country, even those bordering Nairobi, and few came from other large cities such as Mombasa. Step-by-step migration from smaller towns to the large metropolis is not a feature of migration in Kenya. "One-jump" migration, directly from the farmstead to the capital, is the norm in Kenya and throughout Africa. Only four respondents out of the sample of 618 came from countries other than Kenya (Uganda, Tanzania, and Zaire).

There were 605 respondents who gave a definite answer to the question about length of residence in Nairobi. A number of older cultivators simply could not recall when they arrived in the city. Of those who responded, however, the average length of residence was 20.2 years. Fully 85 per cent had resided in the city for at least five years, and more than half (57.5 per cent) had been living in Nairobi for fifteen years or longer. Nearly 15 per cent of all respondents had dwelt in Nairobi for forty years or more (Table 15). These figures are surprising, since they tend to refute one common hypothesis about urban cultivators – namely, that most are very recent migrants who have not yet attained the coveted urban wage jobs that they ostensibly came to Nairobi to obtain (see O'Connor 1983, 67–8 for a summary of the debate on this issue). What is even more surprising, when asked whether they would cease cultivating if they obtained another non-farm job, 84.3 per cent replied that they would continue to cultivate in any case.



Map 4. District of origin of cultivators in Nairobi

Fewer than half of the respondents (42.0 per cent) had previously made their living from farm work. A further quarter were school pupils prior to taking up cultivation in Nairobi, and 10 per cent had previously worked for wages (this group included twice as high a proportion of males as females). About 18 per cent said they were formerly unemployed (Table 16). An unusually high proportion of the sample (10.2 per cent) gave no answer to this question.

These data tend to confirm that previous failure to obtain a sufficiently well-paying farm or non-farm job is connected with the incidence of urban cultivation in Nairobi, although in the minds of most respondents they did not remain unemployed for long enough to list this as their previous "occupation." Most appear to be peasants driven out of farming by the "push" factors mentioned earlier, or children of large rural families who are doomed to a state of landlessness by inheritance traditions or land "reform." What is more revealing, however, is that over half (52.8 per cent) continue to hold down a full-time or part-time non-farm job in the city while carrying on with the cultivation of their urban vegetable plot (Table 17). Most of these jobs are in the urban informal sector and are connected in interesting ways with the cultivation activities themselves. But 12.3 per cent of the sample were engaged in formal sector wage employment or self-employed businesses, and nearly 10 per cent were public sector employees, working for various branches of the government or the City Commission. It is probable that a considerable number of female cultivators who do not have other employment are married to urban wage-earning husbands, and their cultivation activities are a means of supplementing family income, easing the pressures on family food budgets, or asserting their own financial independence.

If a lower limit of thirty-five hours per week is taken as the basis for defining a non-farm job as "full time," then the overwhelming majority of the 274 respondents who reported their hours worked at ancillary occupations (other than cultivation) are indeed engaged in full-time jobs (Table 18). In fact, the average for this sample was forty non-farm hours per week. It must be remembered that cultivation in the city is seasonal or ephemeral, so that what appears as an extremely onerous total workload per week (a full-time non-farm job plus many hours spent cultivating a shamba plot) does not normally last more than a few months each year.

Since many urban workers cultivate their plots in their spare time, it is important that their garden plots be close to where they live,

and in fact this is generally the case in Nairobi. Most were within a few minutes' walking distance, while nearly three-quarters of the sample (73.8 per cent) have their shamba plots within one kilometre of their dwelling. But the obverse of this is that for a sizeable minority, the journey to and from their fields requires that they walk or ride for several kilometres each day, often in addition to their daily journey to and from an ancillary non-farm job. Out of those who also work at non-farm jobs in the city, just under half (46.9 per cent) reported that their shamba plots were more than a kilometre from their main workplace. For Nairobi's urban poor, the hours of rest and leisure are meagre indeed during the all-important planting, hoeing, and harvesting periods. Some of those who held other jobs reported that they paid people to help with cultivation, but most urban cultivators (82.5 per cent of the sample) do not hire helpers, either doing all the work themselves or else asking husbands (or wives) and children to help without pay. Only a handful of cultivators were themselves paid to work the plot by another person.

There is another perspective on these figures regarding ancillary income-generating employment, however. It is clear that almost half (47.1 per cent) of the respondents have no other visible means of earning an independent living than their urban shamba plot. Without it, their status would be that of a total dependant, relying most probably on a spouse or working-age family member. For about 70 per cent of all respondents, their "living" obtained from cultivation is almost purely a subsistence-oriented one: they do not intend to sell any appreciable amount of their crop for cash.

Out of 181 cultivators who intend to sell part of their crop, only 2.4 per cent will sell it all, and only 13.4 per cent will sell half or more than half. The fact that so many urban residents depend so heavily on their garden plots has profound implications for urban development in Kenya, and for questions of government policy towards the urban agricultural sector. These issues will be dealt with in detail later.

The cultivation of multiple plots is a practice maintained by a sizeable minority (30.1 per cent) of the total sample. Many of these plots were separated by considerable distances, perhaps to lessen risks of complete loss from theft, pestilence, or destruction by authorities, or to make use of the advantages of different ecological niches, such as well-watered floodplains and better-drained valley slopes.

Another of the common hypotheses about African urban dwellers is that their rural origins exert a strong and continuous pull while they stay in the city, so that they become, in effect, temporary sojourners in the metropolis, enmeshed in a system of circular migration that eventually leads many of them to return to their home districts (O'Connor 1983, 68). As far as the present sample of urban cultivators is concerned, however, 70.4 per cent announced that they intended to remain permanently in Nairobi. The fact that the other 29.6 per cent do not intend to stay permanently in Nairobi may be taken as evidence that the circular migratory pattern or "pushback" to rural areas (Todaro 1981, 237) still exists, although its effects are not perhaps as strong in the late twentieth century as they may have been several decades earlier when this hypothesis had wide currency. There are, however, marked spatial variations in intended length of stay in Nairobi, contrasting cultivators near the centre of the city with those towards the outskirts. This will be dealt with at length in Chapter 7.

INCOMES OF URBAN FARMERS

The data on incomes obtained in the current study confirm the findings of the Mazingira Institute's report regarding the crushing poverty of the majority of cultivators (Mazingira 1987, Annex 6, 12). The median family income of the 418 respondents who answered this question was only 10,000 Kenya shillings (approximately 525 Canadian dollars). This places the majority of households surveyed in the "low to very low" income categories identified in the Mazingira study (Mazingira 1987, 80–1).

Households with incomes of less than 10,000 shillings a year made up 63.5 per cent of the total sample. A small proportion (4.3 per cent of the sample) may be classed as totally destitute, with reported cash incomes of under 1,000 shillings a year. It is difficult to imagine how such penurious individuals can survive in an urban environment. Even if they paid no rent for accommodation and grew all their own food, there are still aspects of urban life that require outlays of cash, particularly if the household includes children. Another 36.5 per cent of cultivators' households were in the low income range, with annual cash incomes between 10,000 and 20,000 shillings. Only 12.6 per cent of the sample had household cash incomes of 20,000 shillings or greater, and a few of these ranged

upwards of 60,000 shillings a year, a comparatively wealthy minority in this particular context.

The data summarized in this chapter have made possible the sketching of a general profile of urban cultivators and their *modus operandi*. Important details remain to be added, particularly as regards geographic variations and the critical role of women. These aspects will now be explored further.

7 Inner City Farmers and Suburban Cultivators: A Comparison

Urban agriculture, as the previous discussion has shown, permeates both the city and its suburbs. Crops are interspersed with the tin-and-cardboard shacks of the squatters in Mathare Valley, and yet they also frame the ornate wrought-iron gates of mansions in prestigious Muthaiga. The question arises whether these contrasting scenes are part of the same phenomenon, or are entirely separate developments. The general characteristics of urban cultivators outlined in the previous chapter appear to mask interesting and sometimes dramatic spatial variations, particularly between farmers in the inner city areas and those nearer the urban fringes. To illustrate these differences, two representative subsamples have been selected from the larger survey. These are sample areas 7 (with 146 respondents), representing conditions near to the city centre, and 3 (with 127 respondents), representing the milieu of the suburbs in the intensively cultivated yet solidly residential red soil area to the northwest of the city centre (Map 5). The comparison of urban agriculture in these two sample areas makes use of a statistical test (Student's t test) of differences in sample data that are significant at the 1 per cent level.

Area 7 contains a mixture of very dense low-income residential and industrial land uses to the east of the central business district, on the black cotton soil flatlands flanking the Nairobi River. It comprises part of the railway marshalling yards, and the light manufacturing areas adjacent to these, as well as commercial areas and open-air markets

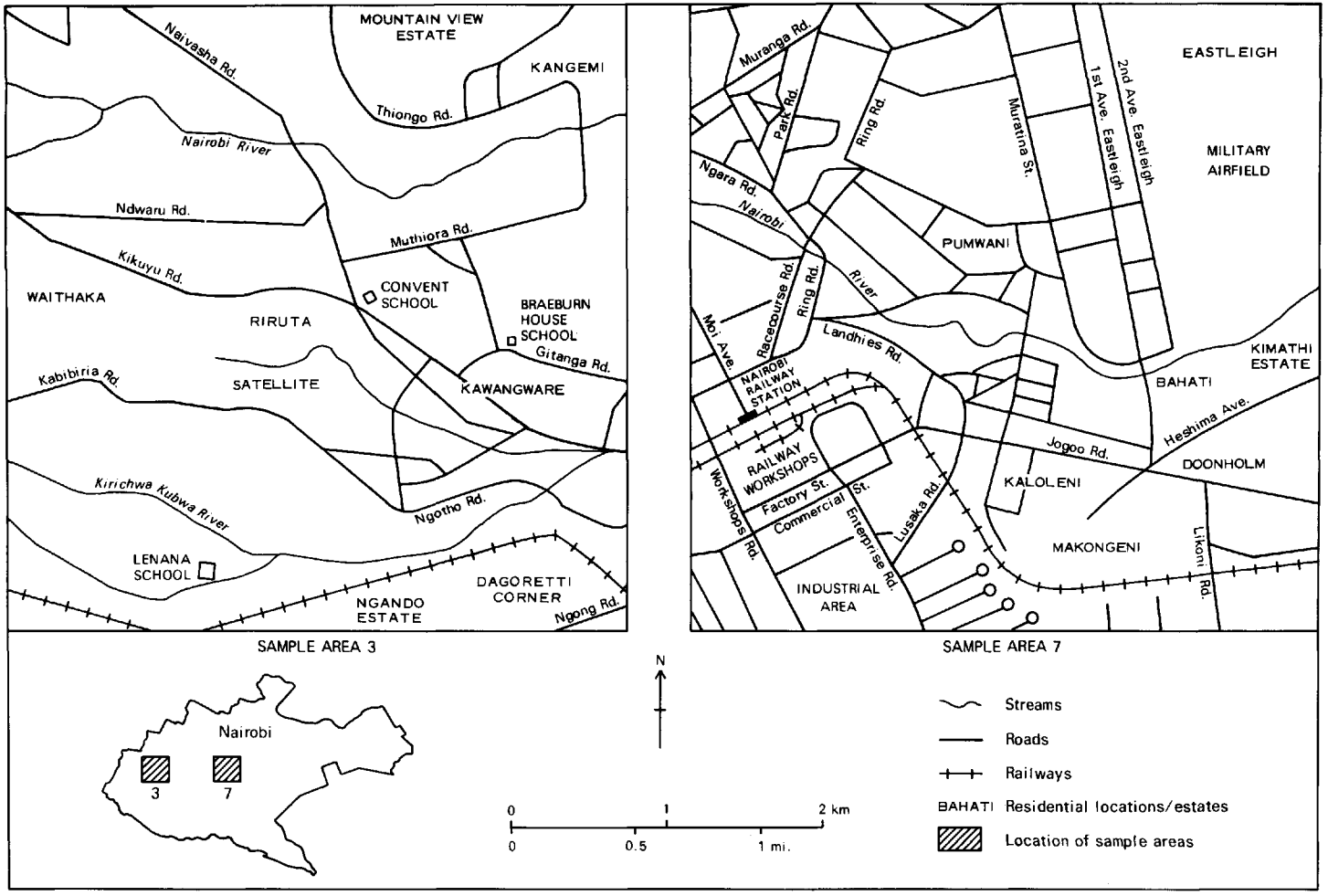
along Landhies Road, Ngara Road, and in Pumwani. It is flanked by the Eastleigh military airfield and Mathare Valley squatter settlement to the north, and high-density African housing estates to the east.

Area 3 is also drained by the Nairobi River and its tributary the Kirichwa Kubwa River, but the soil in this area is mostly deep trachytic red loam. It centres on the large African market and duka centre of Kawangware, and the dense African housing area of Riruta (Map 5). It lies between the two major arterial routes of Waiyaki Way to the north and Ngong Road to the south. Its eastern flanks are the high-income residential areas of Bernard and Thompson Estates, which house many European expatriate residents and wealthy African businessmen. On the west, it grades into intensive peasant agriculture around Dagoretti.

Differences in type of plot location between inner city and suburban environments as represented by these two sample areas include the fact that inner city farmers are much more likely to use public land (or similar sites such as railside or industrial land) and are correspondingly less likely to farm private residential plots (Table 19). The land in Area 7 is also less likely to comprise alluvial, well-watered soil. These differences are to be expected, especially in view of the fact that much of Area 3 was semi-rural until 1964, when it was incorporated along with much of Dagoretti township into the expanded metropolitan area (Lowder 1986, 162). Area 7 is predominantly in the former African sector of the colonial city, and is dominated by crowded and poorly constructed tenements and squatter housing on black cotton flatlands and the slopes of the Nairobi River valley.

Cultivated plot sizes are very much smaller in the inner city. The median size is just under 200 square metres, while the mean is 511 square metres, being skewed by a few very large shambas, including one of six hectares near the Nairobi River. By contrast, plot sizes in Area 3 average over 4,200 square metres, considerably larger than the grand sample average of one-fifth of a hectare.

While Area 3 has a large gender imbalance that is typical of the cultivators in the metropolis as a whole (36.0 per cent are male cultivators), Area 7 has a significantly higher proportion of male farmers (40.8 per cent). In addition, Area 7 cultivators are a much younger group (Table 20): nearly 37 per cent are under thirty years of age (as compared to 12.5 per cent in Area 3) while only 20 per cent are over fifty (34 per cent in Area 3). This inner city area, thus, has more in common with colonial metropolitan areas elsewhere in Africa,



Map 5. Nairobi: inner city and suburban sample areas

which typically are described as having youthful, predominantly male populations. Here we must note that, while women still outnumber men in Area 7, male farmers are relatively more numerous in this area than in most other parts of Nairobi, bearing in mind also that subsistence cultivation is an activity which many Kenyans (both male and female) consider "women's work."

Along with gender and age differences, there are also differences in family size between the inner and outer urban areas. Over 17 per cent of Area 7 respondents are childless (as against 7 per cent for Area 3) and yet nearly twice as many inner city cultivators (5.9 per cent as compared to 3.2 per cent in Area 3) have very large families, with ten or more children. It is apparent that growing numbers of unmarried young women as well as men are gravitating to the large urban centres and being induced by their precarious financial circumstances into informal sector occupations within the central city area.

Educational differences are also apparent. While nearly one-third (31.3 per cent) of Area 3 respondents had no formal education, this was true for only one-fifth of inner city cultivators, significantly more of whom not only finished primary school but also attended high school (30.8 per cent had some secondary education, as opposed to 18.8 per cent of Area 3 respondents).

Patterns of birthplace of respondents in the two sample squares confirm that the inner city is clearly a migration receiving area, while Area 3 on the western urban periphery has a much more sedentary population of longer term and locally born residents. Undoubtedly a significant number of the latter were farming their present plots before this peri-urban zone was incorporated into the city, and have simply continued this activity as the built-up area expanded around them. Fully 41.4 per cent of Area 3 residents were born locally, while another 21.1 per cent were born in neighbouring Kiambu district. In contrast, less than 5 per cent of the cultivators in Area 7 were actually born in Nairobi, and only 8.3 per cent came from Kiambu, the great majority coming from very far afield. Thus, it appears that Nairobi does not follow an allegedly common Third World urban trend in which new migrants predominantly occupy outer fringes of the urban area while the inner city is occupied by longer-term residents who are more settled and more successful.

In the case of Area 3 and other outer fringe sample areas, the social structure is fairly strongly tribal. Areas 3 and 5, for example, are dominated by the Kikuyu, who have traditionally farmed the red soil

ridges to the north and northwest of Nairobi. Certain other sample areas on the east and southwest were once part of the former White Highlands, from which African farmers had been expelled in colonial times. These are less dominated by any one tribal group at present, although areas on the east, for example Area 9, have experienced increasing immigration in recent decades by Kamba people from neighbouring Machakos district. The social structure of the inner city residential or squatter areas appears, however, to approximate the notion of "urban villages" composed of migrants from particular rural areas who cluster together in the city, rather than functioning as a genuine "melting pot" of individuals and families from diverse tribal groups living in complete integration. Of all the areas of the city, however, the central sector seems to be the most "neutral" and detribalized. It was from this area that Kikuyu peoples were expelled and sent to fortified villages during the Mau Mau emergency, and they did not regain their former dominance in the city until the late 1960s.

The picture of Area 7 as a receiving area for recent migrants is supported by data on length of residence in Nairobi (Table 21). Over one-fifth (20.9 per cent) of cultivators in this inner city area have lived in Nairobi for less than five years. This compares with under 5 per cent of cultivators in Area 3 on the western fringes of the city, where more than 50 per cent are long-term residents (thirty years or more in Nairobi). Fewer than 20 per cent of Area 7 cultivators have lived in the city for thirty years or longer.

Most of the cultivators in the inner city area are either renting accommodation or are squatters. In 1969 the ILO estimated that there were 200,000 squatters throughout Kenya, many of them in Nairobi. Squatting was actually encouraged during the colonial regime by the practices of land expropriation and taxation of Africans, forcing them to live as a landless labour force on European estates. Squatting has remained a major problem for the Kenyan government since independence (Mbithi and Barnes 1975, 2).

Differences in previous occupation of cultivators in inner and outer areas tie in with patterns described above (Table 22). Over one-third (36.4 per cent) of Area 7 cultivators were school students before migrating to Nairobi and/or taking up farming in the city. On the other hand, more than half (55.2 per cent) of the outer urban cultivators in Area 3 were farmers or farm workers before taking up their present activities in the city. While some are undoubtedly long-term rural-urban fringe farmers, others are clearly migrants to this area. It is

probable that many of these migrants are kinfolk of farmers in the neighbouring rural areas of Kiambu district in Central Province; or perhaps, because of their farming background, they recognized that the red soil uplands on the northwest of the city had superior agricultural potential and consequently they located their shamba plots here rather than on the black cotton soils to the east.

In summary, the picture of the typical cultivator in Area 7 is of a young, unattached, better-educated recent migrant, equally likely to be a male or a female, who cultivates a small plot near his or her current dwelling in one of the dense housing estates to the east of the central business district. Typically, the cultivator also has a full-time or part-time job, or is actively seeking work, often accepting kibarua (casual work) where this is available. There is no intention of relocating nearer to the outskirts of the city where there is more land of higher quality, as this is too far from the potential high-paying jobs that the Area 7 resident often hopes to enter eventually.

Considerably more than half the cultivators in both the inner city and suburban sample areas hold down an extra job, but in Area 3 this is less likely to be an urban informal or public sector job than is the case with Area 7 cultivators (Table 23). In both areas, for the great majority (over 78 per cent) the other job occupies them for at least thirty-five hours per week.

A comparison of the pattern of responses between cultivators in Area 7 and Area 3 gives mixed evidence regarding the question whether the inner city cultivators have a more truly "urban" outlook than their counterparts in the suburbs. For example, when asked whether they would cease cultivating if they got another job, 24.2 per cent in Area 7 said yes, whereas only 7.8 per cent in Area 3 were prepared to give up farming. On the other hand, when asked if they intended to stay permanently in Nairobi, only 59.2 per cent of Area 7 cultivators said yes, as against 81.3 per cent of Area 3 cultivators.

This variation appears connected to the difference in ownership of land being cultivated. While a considerable number of Area 3 residents own their farmland, the status of their counterparts in the inner city is much more precarious. Fully 80 per cent use public land (Table 24). It is also possible that, being mostly fairly recent arrivals in the city, the latter group in Area 7 feel less settled, and perhaps still have rural families or aspirations to inherit rural land.

Much greater longevity in cultivating plots is evident in Area 3 than Area 7. Over one-fifth (21.5 per cent) of Area 7 cultivators have just

commenced cultivating compared with under 8 per cent in Area 3 (Table 25). More than 70 per cent of the inner city cultivators have been working their current plots for less than five years. By contrast, over 12 per cent of outer urban cultivators have used their current plot for at least twenty years, more than twice the proportion of Area 7 cultivators. Such long-term use is undoubtedly associated with considerable capital improvement of the land, including the growing of tree crops, the use of fertilizers and irrigation, and practices to combat theft, erosion, and waterlogging, such as protective hedges or fences, cover-cropping with legumes, and drainage ditch construction.

While there were few differences between Area 7 and Area 3 farmers on matters of cultivation practices and crop types, there is a major variation in consumption patterns. More than half of the Area 7 cultivators consume all the food they produce immediately rather than harvesting and storing food for later consumption. By contrast, more than 75 per cent of Area 3 farmers store food, most often in their dwelling but in about 8 per cent of cases in a specially built storehouse. Area 3 cultivators store food for a longer period on average: over 20 per cent store food for five months to a year or even longer; just over 6 per cent of Area 7 cultivators will store for such long periods.

While barter exchange is unimportant in both subsamples, and the majority of cultivators in both areas use the bulk of the food produced on their own plots for family subsistence, Area 7 cultivators are somewhat more inclined to sell all of their produce for cash or, at the other extreme, to consume it all. Area 3 cultivators are more apt to dispose of their crop in more complex ways, using only part as a source of cash income through sale to dukas, neighbours, or others, as well as keeping a portion for home consumption. The estimated cash value of crops in Area 3 is considerably larger in most cases than in Area 7 (Table 26), a reflection of the larger size of shamba plots in the suburbs and their tendency to be placed more firmly on a commercial footing.

8 Urban Farmland: Questions of Ownership

One of the most intriguing aspects of the phenomenon of urban agriculture is the question of usufruct arrangements agreed upon by the cultivators and the owners – private, institutional or corporate – of urban open space. When surveyed on this matter in mid-1987, only 23.6 per cent of our sample of 618 cultivators declared that they were using their own or their family's land (Table 27), meaning that the majority were indeed using land belonging to someone else or to the municipality. About 28 per cent were using land belonging to a private landlord, although surprisingly few paid any rent to the landlord for this privilege. Often the "landlord" was a friend who allowed free use of the land. Clearly, use of the land without the express consent of the landlord was common also. In those cases where a rental was charged, it was very small, averaging only a few shillings a month.

The absence of rental charges for cultivable land is surprising in view of the value of urban land for alternate residential or commercial uses, and in view of the effort most urban residents, including landowners, must make to obtain a cash income. Possible reasons for the ability of cultivators to use land without paying rent include the customary precepts of land use and land tenure in rural East Africa, which permit tenants to have usufruct of land without cash payment or sharecropping, provided this is on a temporary basis and certain conditions are met. More will be said about these customary arrangements below.

By far the largest number of cultivators (45.3 per cent) were tilling land that they knew to be public property. The actual use of public land is probably even greater than this, because many who declared that they owned the land they cultivated actually extended their plots from their own property onto nearby roadside verges or other public rights of way. For those whose plots were wholly on public property, the term "squatters" has some validity, although it must be remembered that their use of this land for crop-growing is seasonal and ephemeral, not always continuous or permanent. For most of these, there was no question of obtaining formal permission to use the land, and no payment of an official rent. They simply decided to occupy and use vacant land in the city. Indeed, 2.6 per cent of our sample said they did not know who owned the land they were cultivating.

Most women cultivators, who were the majority group in our sample, would not find it unusual to farm land that they did not own. In rural Kenya, under previous customary land laws and even under modern freehold arrangements, women have only rarely enjoyed ownership rights. The use of public land in the city, for both men and women cultivators, may even have certain advantages in cases where a farmer is growing crops that are illegal under national laws, for example "bhang" (marijuana), as it confers a measure of anonymity in case of trouble with authorities. Ownership of such plots is difficult to prove unless the askaris catch the cultivator red-handed.

Although a considerable proportion (over 28 per cent) occupied private land other than their own, very few actually paid specifically for cultivation rights. Most tenants were probably paying cash to rent their accommodation, but simply used open ground around the rented dwelling as a tenant's right, seeing this as part of the rental arrangement. This interpretation is borne out by the results of the Mazingira Institute study, which found that only 4 per cent of householders without shambas would be willing to pay a landlord for access to such land. The vast majority expressed a belief that they should have access to cultivable urban land "for free."

Under such conditions of uncertainty and informality, and given the prevailing official attitude discouraging such cultivation, one might assume that individual plots would be quite small, and would not be cultivated more than one or two years running. Such is not the case, however. Measurements made by the survey interviewers indicate that over 80 per cent of the plots on vacant land in Nairobi are 100 square metres or more with over 60 per cent being between

200 square metres and half a hectare (Table 28). The inner city area (Area 7), as might be expected, had the smallest average size of plots (about 500 square metres). In only one sample area (Area 5) did the average plot size exceed half a hectare. The overall average shamba size of about one-fifth of a hectare is too small for such plots to be considered as truly viable subsistence farms (although a number of respondents cultivate several plots). Only about 5.5 per cent of the sampled shambas are a hectare or more in extent.

The average length of time each individual plot has been cultivated is 7.2 years, although this figure is affected by the fact that about 5 per cent of plots have been cultivated for over twenty-five years (Table 29). Exactly 40 per cent of the 606 respondents who answered this question said their existing plots have been cultivated for two to five consecutive years, with a median figure of four years.

From the evidence obtained in the author's survey, it appears certain that a number of long-term cultivators, several of whom have been at work in their present plots for more than forty years, are bona fide farmers whose lands were incorporated in the expanded metropolitan area of Nairobi in 1964. Our interviewers, however, found other cases of long-term squatters tilling public land, including some large and prosperous farms covering several hectares. One of these is right on the banks of the Nairobi River near Eastleigh airfield (Map 5). The "proprietor" of this six-hectare farm is a well-known local figure and a member of the ruling KANU party, who has built up a very successful farm over many years. This particular farm is, admittedly, rather unusual in size and scope; the majority of urban plots are nowhere near as large or well established.

As might be expected, there was a statistically significant relationship between the length of time a plot has been cultivated and the age of the cultivator. Many of the most recent arrivals in Nairobi among our sample of cultivators were also quite youthful, while those with a long record of cultivation were correspondingly older. There was also a statistically significant relationship between the number of children dependent on a cultivator and the length of time he or she had been cultivating a plot. This may be an expression of the age relationship outlined above, or may relate to the pressure on those households with many mouths to feed to supplement food supplies through urban agriculture. From the data on backgrounds of urban cultivators, it was apparent that the greater the age of a cultivator, the larger the number of children and the lower the level of schooling

attained, suggesting that formal urban employment would be more difficult to secure and the imperative to cultivate food in the city that much more urgent.

The relationship between land tenure arrangements of the cultivator and alternative income-earning jobs showed that public land was the most frequent locational choice for the plots of urban farmers who had no other job (39 per cent of the 291 respondents in this situation). A further 31 per cent of this group tilled their own family land, while 27 per cent cultivated land owned by a private landlord. Public land was the overwhelming site category for those involved in other urban informal activities. Over 61 per cent of these entrepreneurs used City Commission or other public lands, as against only 14 per cent who used family land and 24 per cent who occupied land owned by a private landlord. Those with jobs in the urban formal or public sectors of Nairobi's economy showed the same predilection for cultivating public land. Only a relatively small group (twenty-one respondents) who reported having other farming activities apart from their urban plot showed a different pattern: over half (52 per cent) of this group were on land owned by a private landlord.

There is some evidence that cultivators on public land feel more vulnerable than those in other categories of land tenure. When asked if they would stop cultivating if they found another job, nearly half of the 97 respondents who answered yes were on public land, as against one-quarter on landlord's property and one-fifth on their own family lands. Similarly, more than half (54.4 per cent) of the 182 respondents who declared that they did not intend to stay permanently in Nairobi were using public land rather than the other land tenure categories. Some users of public land, in an effort to reduce their vulnerability, reported that they had "made arrangements" with officials, such as members of Parliament or City Commission authorities, who then allegedly sanctioned their use of public land.

TRADITIONAL AND COLONIAL OWNERSHIP AND USUFRUCT RIGHTS

These current urban agricultural land tenure arrangements require some explanation, based on the customs and laws of land ownership and tenure that have governed land use in this region in pre-colonial and colonial times. We must preface this discussion by drawing a distinction between land tenure arrangements that exist *de facto*, often

appearing related to customary patterns of usufruct, and those that are *de jure*, based on European concepts of freehold or leasehold. The present City Commission by-laws and stipulations controlling urban land use, and the current register of freehold titles to urban property are, of course, an extension of the British colonial system of land laws and urban by-laws that were inherited by newly independent Kenya in 1963. These legal instruments for *de jure* control of land ownership and use are contained in three pieces of legislation: the Registered Land Act of 1963, the Land Adjudication Act of 1968, and the Local Government Act (revised) of 1978.

These were modified from the laws originally superimposed by the colonial regime upon a system of customary land tenure. This system held sway in the parts of Nairobi occupied by Kikuyu peoples prior to colonial times. Known as the Githaka system, these traditional laws comprise a complex, controversial, and often misunderstood body of arrangements pertaining to the tenure and use of Kikuyu lands (Sorrenson 1967). Similar systems were in force in neighbouring tribal areas, for instance, among the Mbeere (Glazier 1985).

The pertinent aspects of the Githaka system which may be postulated as having bearing on *de facto* land tenure arrangements in parts of Nairobi at present are outlined by K. M. Maini:

> Under the customary land law of the Gikuyu, in Kenya, traditionally ever since Gikuyu and his wife Mumbi founded the tribe, an individual Mugikuyu could own a piece of land for an indefinite period, under a developed and workable customary law. He had the following rights therein or therefrom. He could lease it to another ... he could sell or mortgage the land or trees which grew on it; when he died, the land passed in accordance with customary laws of succession; he might evict trespassers, or grant an easement to his neighbour ... he could define the boundaries by setting fixed markers such as a line of trees or lillies (gitoka) ... a leaning towards the principle of individual ownership was more predominant in the Kiambu area [i.e., on the north and west of Nairobi] ... The ahoi (tenant) under Gikuyu customary law acquires an estate for an indefinite period. The sublease, however, can be terminated, except in the Kiambu area, by the will of either the landlord or the tenant. The tenant is allowed to harvest his standing crops even after termination by the landlord ... In the Kiambu area the tenant is permitted to assign the sublease to another *inter vivos* if he has the consent of his landlord (Maini 1967, 3–4, 11).

Thus, although the Githaka system differed somewhat from clan to clan, in the Nairobi and Dagoretti areas it appeared to have elements of freehold ownership as this is conceived in modern British law. Confusion arises, however, because in some cases the rights to land were not regarded as an inseparable whole, but as a bundle of rights (usufruct, tenancy, inheritance, and sale or redemption) which, under certain conditions, can be detached and traded separately. Thus, for example, land could be transferred without the mature trees on it passing to the new "owner."

A consequence of systems such as Githaka was the extreme fragmentation of parcels of land after generations of division and subdivision among sons of a man and his wives. But this ensured access by all to a variety of different types of soil and ecological conditions, helped maintain fairness and egalitarianism among clan members, gave opportunities for cultivating a range of different crops, meant that distances from the homestead were about the same for all, and resulted in parcels of land with clearly demarcated and accepted boundaries.

Traditional attitudes towards tenants (in Kikuyu called "ahoi," and in Mbeere, "avoi") on agricultural land under the Githaka system are significant in the present study, since they appear to have bearing on the attitudes of urban landlords (often themselves recent rural immigrants) and public officials towards the use of land by tenants or squatters. Tenants not part of a clan (mbari) could be given access to land by attaching themselves to a powerful elder and pledging work or support, but no formal rent agreement was involved. These elements of Kikuyu customary law applied to lands in what are now the outskirts of Nairobi within the memory of numerous elderly people still living in this area.

Sorrenson (1967, 187) points out that a succession of British administrators, beginning with John Ainsworth in 1902, failed or refused to see the important distinction in traditional tenure systems such as Githaka between individual and communal control of land. Maxon (1980, 386) accuses the British of social darwinism in their self-serving attitude to land rights. By ignoring individual ownership rights guaranteed under the Githaka system, and forgetting that bush fallow (temporary abandonment of plots) was part of the cultivation practice in the area, Ainsworth instituted the confiscation of Kikuyu land without individual compensation, and sold it to white settlers as freehold land. By 1933 the British had alienated nearly 176 square kil-

ometres of Kikuyu high-potential land. The neighbouring Kamba had lost about half of their best grazing land, which was also confiscated by the government to sell to European ranchers (Mbithi and Barnes 1975, 42). British officials such as M.W.H. Beech, at one time district commissioner of Kiambu, and anthropologists such as Louis B. Leakey, who studied the Githaka system and recognized its provisions of individual ownership in the Kiambu region, were disregarded (Beech 1917; quoted in Glazier 1985, 199, 205; Leakey 1952, 4–6).

During the colonial period and in the decades since independence, a strongly evolutionary view of the whole issue of rural land use and land tenure has held sway in official circles in Kenya. As early as the last century, Lord Lugard and others espoused the view that African agriculture would move inexorably through a series of stages, from "primitive" communal tenure with shifting cultivation, through "tribal," centrally administered allocation of land parcels for individual usufruct on a more permanent basis, to "advanced" land tenure systems based on registered freehold title (Maini 1967). The imposition of land reform in Kenya, spurred on by the Swynnerton Plan (Colony and Protectorate of Kenya 1954), followed this evolutionary view. On the face of it, the reform process had the goal of hastening the transition towards freehold and the higher productivity this promised. A number of critics have seen other, less noble motives in this campaign:

> Land reform in Kenya springs from national policies which regard customary systems of land tenure as inimical to the goals of increasing agricultural output and rural incomes ... the process has been complicated in the Kukuyu area around Nairobi by the alienation of tribal land for white settlers ... recognizing the central role of [this confiscation of Kikuyu] land in precipitating Mau Mau activity, the colonial government concluded that security of tenure would render small holders immune from the influence of radical politicians attempting to mobilize the disenchanted (Glazier 1985, 5).

Land reform, it now appears, had a political rationale, which was the creation of a buffer of stable, conservative African smallholders to blunt the effect of radical insurgency. It had an adverse consequence on African society that was fully expected and accepted by its British authors – namely, the creation of a landless class (Colony and Protectorate of Kenya 1954, 10). Land reform had removed the mechanism whereby landless and unemployed members of a clan, or

ahoi attached to a clan, were absorbed and catered for without the need for migration and its attendant disruption of family relationships.

A MODERN URBAN AHOI?

Despite the imposition of British land laws during the colonial period, it is probable that traditional concepts of the rights of ahoi or landless people who occupy or gain access to land in this area still hold validity for many Kikuyu. Thus, the factor deciding who will have access to open space in the city of Nairobi may not simply be the *de jure* view of public open spaces as untouchable no man's land, and of informal urban cultivators as squatters, devoid of rights, illegally farming City Commission or private land. Rather, the evidence suggests a different perception on the part of both the landless and the landowners in the Nairobi area. There seems to be an acceptance of *de facto* inclusion in the pattern of urban land tenure of a modern urban ahoi, who have reasserted their customary right (which once held sway in this region) to usufruct and to security from arbitrary eviction or confiscation of their crops.

The unwritten rule now followed by the City Commission of sparing small crops from destruction despite their illegality under the letter of the colonial-inspired law accommodates, whether consciously or unconsciously, the traditional view of tenancy rights, and lends a measure of security to Nairobi's landless. This may help explain why so many respondents in the present survey, even those without supplementary jobs who are totally dependent on their urban shambas, declared that they intend to remain permanently in Nairobi. The fact that the majority of cultivators on public and private land are women, the traditional tillers of the soil under the Githaka system, may help to reinforce the view that they are *de facto* tenants abiding by customary usufruct principles and not usurping squatters threatening or challenging *de jure* land ownership in the city. The traditional attitudes and customary laws pertaining to women as owners, tenants, and cultivators of land in the highlands of Kenya have important bearing on the whole pattern of urban agriculture, and also on the differences in cultivation practices between women and men. The issue of these differences is considered in the next chapter.

9 The Role of Women Cultivators

After years of neglect by researchers, the study of women as food producers, business entrepreneurs, and agents of Third World development has recently attracted a flurry of scholarly attention. There are, however, still many gaps in the growing body of knowledge regarding the role of women in the rural and urban economies of developing countries. If, for example, the role of women cultivators in rural areas has been so overlooked that one researcher has called them the "invisible farmers" (Sachs 1983), it is little wonder that their food production efforts in large cities have gone almost unnoticed until the present.

It is probable that this oversight arises from some current misconceptions about female participation in urban agriculture. These, as we have suggested earlier, include the idea that urban agriculture is "not possible"; that females migrating to large cities are "no longer able to carry on subsistence activities within the urban setting" (O'Barr 1976, 14); that gardening in the city is a form of recreational pastime for housewives or a minor and unimportant domestic activity like doing the family washing; that, when women engage in economic activities in the city, these are supplementary to the main income of the male household head, and are limited to petty trading, wage work, or crafts; and that the farming skills of rural women migrants are abandoned in the city. Yet the evidence is growing, in Africa at least, that women are major producers of food in large cities now, as they have always been in rural areas.

This economic importance of urban women cultivators is, nevertheless, a fairly recent phenomenon. During the colonial period African women were actively discouraged both by the colonial authorities and by their own clans from migrating to the towns, and serious gender imbalances were a chronic feature of many colonial cities. In 1927, for instance, there were fewer than five thousand females in the city of Nairobi out of an African population of twenty-five thousand (Hake 1977, 44). Pass laws made it difficult for even male Africans to live permanently in towns or gain long-term jobs, and for women the chances of legitimate employment were even less. Single women in the city were particularly suspect, often being branded out of hand as prostitutes.

But this exclusion of women from cities was not all on the part of the colonial administrators. African rural society kept women subservient, uneducated, and immobile, tying them (as more than one observer has put it) in youth to their fathers, in marriage to their husbands, and in old age to their sons. They may have been given land to cultivate when they married, but they did not own the soil they tilled. If they failed to marry or were divorced, they remained landless (Allison 1985, 136; Diop 1988, 144). It is ironic that even today in the agricultural areas of the Kenya highlands women rarely own land even though they are the principal cultivators. The same is true in many other areas of Africa which, in the words of Ester Boserup, is "the region of female farming par excellence" (Boserup 1970). Today women make up as much as 80 per cent of the agricultural labour force in large areas of sub-Saharan Africa (Momsen and Townsend 1987, 174), and they do the bulk of the hard, day-by-day toil in the fields.

Traditionally, in many farming societies, men played a role in the heavy work of clearing the forest or brush from the land and piling it into heaps for burning. Thereafter the work of preparing the soil, planting, hoeing, watering the growing crop, and harvesting was done by women and girls. This was in addition to their usual domestic chores of preparing food, housekeeping, and rearing children. Yet in the patrilineal agricultural societies, tradition prevented women from claiming any land as their own, or from bequeathing, buying, or inheriting land.

There is nothing in the literature to suggest that the specific role of men in this traditional division of labour has carried over into urban agriculture. There is, moreover, little evidence either in the

present survey or in the Mazingira Institute study that husbands commonly work alongside their wives in the fields. The ILO report (1972), however, notes an important consequence of another aspect of the division of rural labour between men and women that applies with even greater force to the place of women in urban agriculture:

> The division of labour between men and women in the rural areas creates further employment problems. The role of women is often governed by traditions set long ago, in different economic circumstances. With the change in economic activities – from cattle to crops, from existing crops to others with different patterns of labour requirements – and with the children at school and often the husband in town, the traditional allocation of work no longer fits the modern demands and supply of labour. The common though not universal result is that women work extremely long hours, much longer than the men in the same families. Quite apart from personal weariness, this often appears to leave many women with insufficient time to complete all their duties satisfactorily, particularly at peak seasons of labour demand (ILO 1972, 3).

Until the end of the colonial period, with most women excluded from cities and fully occupied in rural areas, the cultivation of urban land was mainly carried on by males employed as household servants, gardeners, and labourers, or living in the city as vagrants or informal sector entrepreneurs. At independence in 1963, an influx of women into the cities began, as African businessmen and civil servants, responding to the Africanization program of the Kenyan government, brought their wives and families to live with them, and the colonial strictures against women and children in cities were swept away. Land reform in farming areas also brought many rural women into the cities looking for employment. This occurred as the plots they traditionally cultivated were awarded by the land tribunals to other, almost exclusively male, applicants, and the planting of cash crops (the preserve of African males) ousted the women's subsistence crops from family farms in the high-potential lands. In a few cases, women did acquire title to agricultural land, and were able to make important decisions regarding use or disposal of their property. In this sense, land reform has been a partial boon to some rural women. It remains an open question, however, whether land reform, by pushing many more landless women to the cities and into urban agriculture, was a means of emancipation for women or a mechanism for re-establishing

their traditional subservience, the only real change being in their place of residence.

Once in the cities, the lower educational status of most women placed them at a grave disadvantage for formal sector jobs, not to mention the strong and widespread bias against women as property owners or authority figures. Formal unemployment among women was undoubtedly higher (although statistics on the matter are sketchy: in 1972, the ILO estimated unemployment rates for women at 10–17 per cent for household heads, and 23–27 per cent for non-heads: ibid., 57). Women were forced to look elsewhere than the formal sector for a livelihood, or else to accept the status of a total dependant. The jua kali sector attracted large numbers of women, but here, too, the competition from better-educated males was fierce for the higher-paying types of activity. Many women had no schooling at all, and the only skills they could rely on were those they had learned as farm girls: food preparation, domestic duties, and cultivation. Under the circumstances, it is not surprising that many of the new arrivals turned to farming the vacant lots and public open spaces of the city.

An added incentive is the family burden borne by women migrants. Often the cash income of African families in Nairobi from wage employment, petty trading, and crafts is inadequate to provide sufficient food and other necessities, and the feeding of children in particular is a strong stimulus to desperate women to ignore the city by-laws against urban cultivation and risk growing subsistence crops on vacant land. A point which must be made here is that, for women (and men) prepared to take this risk, there is at present ample vacant land suitable for cultivation in Nairobi. Some of this land, admittedly, is private open space held by speculators pending eventual sale and development. But a great deal is public land – for example roadside verges, parks, way-leaves, and institutional land – that will be vacant in perpetuity, and thus available to urban cultivators into the foreseeable future.

Evidence from the 1987 sample survey of urban agriculture in Nairobi throws some light on the particular ways in which women cultivators differ from men as regards background, cultivation practices, motives, and problems of farming. In some aspects of farming, of course, there were found to be no statistically significant differences between males and females. Below we examine some of the salient characteristics of women farmers that do appear significant.

First, as regards geographical distribution, women heavily outnumber men in the alluvial valleys and black cotton flatlands in the north-

east and east of Nairobi (sample squares 8, 9 and 10 have about 75 per cent women cultivators), are somewhat less predominant in the northwestern red soil areas near the former Kikuyu reserve (about two-thirds of all cultivators), and only slightly outnumber males in the central urban area (sample square 7) and along the southwestern borders of the city near the National Park (Map 3). Males are predominant in one area (sample square 2). Given what has been said previously about competition between the sexes for high-paying jobs, females appear not to be disadvantaged as regards the type of land selected for farming: women are marginally more likely to opt for riverside locations or other public land, while men may choose roadside verges with slightly greater relative frequency, but the differences are not highly significant.

Both male and female cultivators had plots that ranged generally between one-fifth and one-third of a hectare, with women's shambas being larger than men's in areas 1, 4, 5, and 10 (Table 30). In some areas, however, women's shamba plots were much smaller, for instance in the inner city (Area 7) and in the northern suburbs (areas 8 and 9). Overall, therefore, the average individual plot size cultivated by men was somewhat larger, but women tended to cultivate multiple plots in different locations to a far greater extent than men.

There are no significant differences in the age structure of male and female cultivators. Some gender differences do occur, however, in the family patterns of cultivators. Over 16 per cent of males are childless, as against fewer than 8 per cent of females. It would appear, therefore, that relatively fewer males are growing crops to feed their own children. On the other hand, relatively more males reported very large families (of ten or more children), indicating polygamous marriages. Most respondents, both male and female, reported families of from two to six children.

One of the most striking differences, admittedly an expected one, between female and male cultivators was in educational status. Over one-third (34.3 per cent) of all female cultivators had no formal schooling, compared with under one-fifth (19 per cent) for males. More than half of the males had completed primary school, whereas little more than one-third of all females had done so. Only 16.4 per cent of females had one or more years of secondary schooling, compared to nearly 30 per cent of males. The rate of tertiary or other education beyond secondary school was low for both groups, but was twice as high for males as for females (7.8 per cent as against 3.8

per cent). This is an improvement over the situation in 1969, when it was discovered that over 75 per cent of women aged twenty-five to forty years had never been to school (ILO 1972, 296). But it still indicates an appalling situation for women in Kenya as a whole and in the cities especially, where at least a primary education is a necessity for gaining any sort of remunerative non-farm job.

A possible inference from the above data is that women's lower educational status, by depriving them of a chance at better-paying, formal sector or intermediate sector jobs, has forced them into one of the few occupations which does not require any schooling. The veracity of this interpretation will be tested later, when the stated motives of women cultivators are examined.

While the overwhelming majority of both men and women were not born in Nairobi, women are relatively more numerous than men among the more recent arrivals. Over 12 per cent of females had been in the city for two years or less, as against 6.3 per cent of males; for those living five years or less in Nairobi, the figures rise to 21.7 per cent of females and only 13.6 per cent of males. For ten years of residency or less, the figures are 41.6 per cent of all females and 28.5 per cent of all males. There are, however, no gender differences for long-term residents and cultivators (about 28 per cent of both males and females said they had lived in Nairobi for thirty years or more.

The actual spatial patterns of migration differ for women and men. While the districts of origin for male cultivators were scattered across all the agricultural areas of Kenya and even its neighbours, female migrants mostly came from fewer, closer rural home districts. It appears that the "friction of distance" acts more forcefully on women migrants than on men.

Gender differences were apparent also in the previous occupations of urban cultivators. For women, there were relatively fewer respondents who were wage-earners or school pupils prior to taking up cultivation, but relatively more who had been unemployed or were shamba workers. This fits with the general picture of women as a largely underemployed (in the sense that they do not hold full-time wage jobs), undereducated, and underprivileged group in both rural and urban areas of Kenya. Nearly 60 per cent of all females, in fact, have no other job but the cultivation of their urban shamba.

This contrasts starkly with males, of whom nearly three-quarters, at the time of the survey, held down some other form of job. Out of those men and women who did have an additional money-earning

job, men were much more likely to have a formal, informal, or public sector job that did not involve farming, while women quite commonly had other farm plots elsewhere in the city (this was the case for 36 per cent of the female subsample) or worked on the farm plots of neighbours. The other jobs of the males, moreover, were much more likely to be full-time jobs, and to enjoy pay rates often one-quarter to one-third higher than for women in the same or similar types of activity. About 80 per cent of males with other employment spent forty hours a week or more at those activities, compared with 62.6 per cent of females reporting other jobs. Women, in short, spend relatively more time cultivating than men, have multiple shamba plots more often, but cultivate somewhat smaller individual plots than their male counterparts.

Interestingly, there were no significant differences between the sexes on the questions of future intentions concerning permanent residence in Nairobi and continued cultivation of their shamba plots. Fewer than 20 per cent of either sex would cease cultivating "if they got a better job," and fully 70 per cent of both sexes announced their intention to stay permanently in Nairobi. There were, moreover, no significant differences in the distance of farm plots from place of residence, type of land tenure (owned, rented, or "borrowed"), use of hired help, or length of time a plot has been cultivated. For both males and females, 47 per cent had used their current plot for three years or less, and about 68 per cent for six years or less. It is probable that this indicates a pattern of field rotation in which plots are left fallow after a few years' use.

On the question of theft of crops, once again gender differences appear. Relatively more women expect some of their crop to be stolen (45 per cent of females as against 39 per cent of males), and to experience theft on a larger scale (i.e., more than 10 per cent of their entire crop). Of those women surveyed, 7 per cent expected to lose between one-fifth and a half of their crop in the 1987 season. Men were more likely than women to guard their crops personally at harvest time, or build a protective fence. Women appear more passive in the face of this threat, with 95 per cent saying that they would take no anti-theft precautions at all. As noted previously, however, relatively few of the cultivators, male or female, took any specific actions to prevent theft of their crops.

Finally, there are gender differences in disposal of the crop. Women are more likely than men to share an appreciable proportion (10 per

cent or more) of their crop with non-family members (17.2 per cent of females would do so as against 13.4 per cent of males). On the other hand, men are more likely than women to sell virtually all their crop (5 per cent of males would do so, but only 1 per cent of females). Women tended to place a lower cash value on their current crop. Only five women estimated the value of their current crop at or above 2,000 Kenya shillings (the highest was only 2,200 shillings), while thirteen men reported current crop values of over 2,000 shillings (five of these were over 10,000 shillings). When cultivators do sell their crops, men are more likely than women to sell outside the usual channels (these being sales to neighbours, to a local duka, or through a market stall).

As noted earlier, there were many aspects of urban agriculture in which men and women cultivators display no differences at all. Those outlined above, however, indicate that for urban women the work they expend on their shamba plot is not by any stretch of the imagination a form of recreation or a pastime lightly indulged in by housewives. It is a serious, even critical, business for most of the women farmers of Nairobi. This can be seen from an examination of the stated motives for cultivating given by women respondents. The overwhelming concern of most women is to provide their family with enough to eat, and many leave no doubt that, were they for some reason to cease cultivating, the consequences for their families would be severe. Others express their motives in terms of a wish to be self-sufficient or independent, to have something of their own, or to keep themselves active. Despite the fact that women tend to spend more time cultivating than men, relatively few see their activity in purely commercial terms, or if they do, they see it as a way of supplementing family incomes rather than in terms of profit.

10 Maize, Beans, and What Else? Cultivation Practices of Nairobi's Urban Farmers

The principal season for urban agriculture in Nairobi is the long rains which normally commence around the beginning of April and continue until the end of June. At this time, plot preparation and planting of a wide range of crops is carried out in vacant lands throughout the city. The period of short rains, around late October to early December, is reserved for a few quick-growing varieties of vegetables. The results of the York–Kenyatta University survey relate to cultivation practices during the long rains.

THE SIZE OF URBAN SHAMBAS

Urban shambas, whose size varied in the author's sample from five square metres to over six hectares and averaged just under 2,300 square metres (Table 30), represent quite different things to different cultivators. The vast majority of shambas in all areas of the city are creations of the very poor, and represent a major source of subsistence for the urban underclasses. A minority are clearly commercial farms, whether or not they occupy privately owned land. A few are "hobby farms" in miniature, cultivated as a form of recreation by middle-class householders. Both of the latter two categories are more likely to be encountered in the suburbs than the inner city, where shambas are smaller and often more intensively cropped. In general, however, plots sampled in this survey of urban open space cultivation are larger than those investigated in the Mazingira Institute study (which

recorded a mean of ninety-nine square metres: Mazingira 1987, Annex 6, 16) for the probable reason that the majority of the latter, in contrast to the author's survey, were mostly backyard, kitchen-garden plots, and thus were constrained in size by the dimensions of the urban residential allotments on which they are situated. Overall, open-space shambas in the red soil areas of the city tended to be the largest, averaging around one-quarter hectare.

A characteristic of urban farming as a whole, irrespective of the particular location within the city, is the marked variation in sizes of individual plots vis-à-vis their immediate neighbours. Smaller plots were frequently planted with crops that provided higher yields per square metre, while larger plots had more widely spaced, and more varied types of crops, although there were numerous exceptions to this generalization.

It appears also that the size of shambas is a reflection of the work-load involved for individual cultivators. It could be inferred, thus, that the average-sized plot on vacant land in the city (about one-fifth of a hectare) takes an individual about the average number of hours per week to cultivate (i.e., forty hours) for the duration of the growing season. Larger plots probably require that family, friends, and (rarely) paid employees be organized into work parties, available when needed to plant, hoe, and harvest.

Shapes of cultivated plots were extremely varied also, from neat rectangles bordered by hedges or fences to shapeless patches barely distinguishable from surrounding vegetation and masked by terrain irregularities. Plots were generally kept in good condition, however, and most were free of weeds and rank grass.

TYPES OF CROPS

A considerable variety of crops is grown on these plots of hand-tilled ground. In the vast majority, individual crops are not planted out in separate rows, but are intermixed to form a medium-density ground cover. Most plots had at least three different crops mingled in this fashion, making estimates of the area occupied by each type of crop extremely difficult. Hence, only the overall plot size has been included in this analysis, and statements as to the dominance of particular crops must be accepted cautiously, being based in many cases on perceptions of interviewers rather than actual physical measurement.

Maize (*Zea mays*) was perceived by the interviewers to be the most prevalent and most important crop (in terms of frequency of plantings and overall area) grown in these informal shambas in Nairobi (Table 31). It is listed as the dominant crop in almost 55 per cent of all urban shambas (338 plots out of 617). This is not surprising, since maize is the most important cereal crop in East Africa, and is a subsistence staple throughout much of the continent. Varieties suitable for planting in the highlands were, however, introduced relatively recently in Kenya's history. The plant is quite susceptible to variations in moisture conditions at certain points during its growing cycle, and is particularly sensitive to waterlogging, a problem which is common in some of the riverside areas of informal agriculture in Nairobi (Acland 1971, 127). Maize produces prolific yields (as much as 1,200 kilos per hectare) in areas of better-drained soil in and around Nairobi, provided it is sown early in the rainy season, adequate rainfall occurs, and the crop is kept free of weeds. An average-sized shamba on vacant urban land, therefore, may harvest 200 kilos or more in a good season. Average production of all types of urban crops was found by the Mazingira Institute to be about 121 kilos of food per season (Mazingira 1987, 105).

Maize is commonly interplanted with bush beans or climbing beans (varieties of *Phaseolus vulgaris*). The latter crop was listed by interviewers as being dominant in 71 (11.5 per cent) of the sampled plots in Nairobi. A quick-yielding crop that, like maize, requires reliable rainfall during the growing season, beans are harvested from among the slower-growing maize stalks by uprooting the entire plant and threshing the seeds from the pods. Beans are eaten with maize flour or "posho" in traditional East African dishes favoured by subsistence dwellers.

Potatoes (*Solanum tuberosum*), introduced from Europe during the colonial period, and sweet potatoes (*Ipomea batatus*) are the leading crops in 54 (8.7 per cent) of the sampled plots. Sweet potatoes are particularly important in small, unirrigated shambas since the perennial vines are drought-resistant, and grow in a wide variety of soil types, from alluvial, poorly drained, and swampy areas to those that are leached and eroded (Acland 1971, 33). Both potatoes and sweet potatoes are often grown in pure stands rather than being interspersed with other plants. Potatoes were frequently subject to diseases such as blight or bacterial wilt and do not produce high yields unless fertilizer is used. They are usually planted in well-drained, lighter

soils rather than heavy alluvium. They have an advantage in that they can be stored for a considerable period after harvesting, or can simply be left in the ground until needed. In contrast, sweet potatoes cannot be stored for more than a few days after harvesting, so only the immediate needs of a family will be harvested at any particular time, the rest of the crop being left in the ground.

Sukuma wiki, a green vegetable of the spinach variety (*Spinacea oleracea*) that was mentioned as the most commonly grown vegetable in the Mazingira study, is listed in the author's survey as dominant in 38 sampled plots (i.e., the fourth-most important at 6.2 per cent of the total). It is an easily grown, important element in the subsistence dweller's diet, especially in the red soil areas of Nairobi. The Kiswahili name, sukuma wiki, meaning literally "to eke out or stretch out the week," gives a clue to the role of this crop in supplementing the meagre diet of low-paid wage-earners until their next pay. Sukuma wiki is more filling than European spinach, since it is not reduced in volume by boiling and has a more robust texture. Consequently it is favoured as a supplement to ugali (maizemeal porridge) or other dishes. Since less of it is required to make a meal than spinach, it is akin to a staple vegetable, and is often eaten without meat or maize in poor households.

A common crop in better-watered areas, such as along the banks of streams, is the perennial root crop locally called arrowroot or, in Kiswahili, nduma. This is not the same as the West Indian arrowroot (*Maranta arundinacea*), but is in fact the cocoyam (*Colocasia antiquorum*). It is more likely than other crops to be grown under monocultural conditions, especially in waterlogged or alluvial silt soils, which it favours. Its broad, lilly-like leaves shade out competing plants, obviating the need for weeding. Nduma dominated the crop pattern in thirty-three sampled plots (5.3 per cent).

Many other types of field crops are significant, including familiar European vegetables such as cabbage, onions, peas, and tomatoes, but tropical crops such as sugar cane, cassava, pigeon peas, and cowpeas or "kunde" are also locally significant. Except for sugar cane, the latter are all drought-resistant and are particularly suited to the types of growing conditions in the easternmost areas of Nairobi, where soils are less fertile and drier. Sugar cane (*Saccharum officinarum L.*) is favoured as a windbreak or field border, and grows well on alluvial flatlands in the city. Its juice is used as a sweetener, and is also an ingredient in illegal beverages such as pombe (beer) and

chang'aa (a fiery liquor). Cassava (*Manihot esculenta*), being propagated from cuttings (seeds need not be purchased), is a common crop, but rarely dominates an entire plot. Tolerating exhausted or impoverished soils, withstanding drought, diseases, and insect pests, and requiring minimal attention after planting, it is an indispensable crop of the very poor or marginal farmers in and around Nairobi. It is, however, less important here than in coastal areas of East Africa, for example in Mombasa, where it is one of the three most important crops in terms of volume of production (Mazingira 1987, 102). Pigeon peas (*Cajanus cajan*), a tall, woody legume favoured in drought-prone areas of Eastern province, is often grown by the Kamba migrants in Nairobi who have come from these areas. Cowpeas (*Vigna unguiculata*) is likewise favoured by migrants from Machakos district, and is grown for its leaves, pods, and seeds that are all used as subsistence food by poor residents of Nairobi.

Although some traditional African food crops such as finger millet (*Eleusine coracana*) and sorghum (*Sorghum vulgaris*) are grown in the Nairobi area, few instances of their cultivation were found in the 1987 sample. There was, moreover, almost no cultivation of non-food crops in the city. Only twenty-one cultivators grew flowers for sale, while nineteen grew Napier grass (a fodder crop), six grew ornamental trees, and nine grew other cash crops ranging from vegetable bath sponges (*Loofah*) to miraa (the narcotic herb *Catha edulis*) and coffee (*Coffea arabica* and *C. canephora*).

Bananas (*Musa spp.*) were by far the most common tree crop, and many shamba plots had at least a few stems of a locally adapted variety such as Muraru. In some places along the better-drained and fertile slopes of the Nairobi River, however, extensive stands of banana trees were observed. Occasionally, a few papaws (*Carica papaya*), mangoes (*Mangifera indica*) or various citrus trees were encountered, but for the most part, few urban farmers cultivated tree crops or other perennial crops. Many respondents stated that they believed tree crops, and cash crops generally, were forbidden by the City Commission: in fact, all their produce was illegal under the strict letter of the law.

The relative absence of tree crops is obviously related in part to insecurity of tenure for the majority of urban farmers, who cultivate borrowed land and who realize that they could be evicted at any time. Bearing in mind that tenants in some rural areas are often forbidden to plant trees, for fear that this will later be used as legal grounds by

those tenants for wresting the land title from their present landlords, it is not surprising that urban landlords and City Commission officials will also be extra vigilant against the planting of trees on their land.

It was not uncommon for urban cultivators to raise livestock as well as food crops. In fact, 55 per cent of all respondents kept some sort of livestock, the most usual being chickens (about 30 per cent of sampled cultivators). In some areas, farmers complained that they recently lost their flocks of chickens due to a fatal disease. Thus, it seems likely that, at the time of the survey, the incidence of poultry-keeping was somewhat lower than usual, even though a number of respondents said that they had turned to raising ducks instead of chickens.

Goats were the second most popular form of livestock (eighty-two respondents kept goats), with cows third in importance (fifty-three respondents), especially in less-populated areas on the edges of Nairobi. Goats are more suited than cattle to urban browsing, for they also scavenge garbage piles, and there is a ready market for their meat and milk. Sheep, pigs, and other livestock were encountered in twenty-two cases, again mostly towards the outskirts of the city.

Apart from chickens, which are mostly free-ranging, other types of livestock are usually tethered or penned close to the owner's residence, rather than being allowed to roam freely. Often animals are placed in the charge of children who supervise their grazing on vacant land.

An activity noted by the author is the cutting of natural hay along the roadsides in the northern parts of the city. During the rainy season Kikuyu women scythe the lush grass on roadside verges with pangas, and stuff the grass into 90-kilo maize bags for collection by a dealer, most probably to be transported to market in his truck to be sold for animal fodder. While not, strictly speaking, a form of cultivated crop (and thus excluded from this survey), hay is nevertheless a product of the city's open spaces with evident commercial value.

CULTIVATION PRACTICES AND IMPLEMENTS

Cultivation practices mentioned by urban farmers are for the most part very basic, traditional, and conservative, being dependent on hand labour with only a few simple and inexpensive tools. The universal farming implements in this area are the panga or sturdy bush knife, and the jembe or hoe. Out of the total sample, only 108 people

did not own a panga (and many of the latter borrowed one from somebody else). Pangas are versatile implements, being used at all stages of preparing the land, planting, weeding, and harvesting. Jembes are equally common and almost equally useful in preparing and weeding such crops as maize. A third implement frequently encountered is the uma or pronged hoe, especially useful for weeding in areas where coarse grasses threaten to choke the growing crops and their trailing stems and roots have to be completely removed. A few cultivators use European-style spades or pitchforks, and a handful of the very poorest cultivators who do not have a panga use the traditional dibble stick.

Very few cultivators, however, own a watering can or even a bucket for carrying water to the crops. Irrigation, in consequence, is not common in the shambas occupying the open spaces of Nairobi. This does not appear to be a major impediment to agriculture in an area that receives an annual rainfall of about 880 millimetres, but the factor of *reliability* of rainfall is critical, and drought or lateness of the planting rains is the most frequently mentioned fear or problem of the sampled urban cultivators.

The value of tools owned by cultivators was found to be very low: less than 300 shillings in all but twenty-five cases. In fact, the vast majority own less than 200 shillings' worth of tools. Borrowing of implements is therefore a widespread practice.

Plot rotation or fallowing of the land is practised by a significant number of cultivators, simply by hoeing a slightly different part of the same vacant land each year. Since there is still ample vacant land in the city, this practice will probably continue to be possible in the years ahead. The Mazingira Institute report found that 18 per cent consciously practised fallowing, while 31 per cent use crop rotation as a way of restoring soil fertility (Mazingira 1987, 26–7). This, however, included a large number of enclosed kitchen-garden plots, on which fallowing would be less likely than in larger open spaces of the city. The evidence from the author's survey of open space cultivation suggests that there is a type of shifting cultivation being practised in the city, with plots being used for an average of about four years even by residents who had farmed in the city for extended periods. There is evidence that the actual period of use before the plot is fallowed is a function of the scale of farming, type of tenure, use or non-use of fertilizer, and types of crops grown. Even for those farming on borrowed land, the effort and cost expended in clearing

and preparing the plot is such that they will naturally be inclined to reuse the same plot until there is a noticeable decline in yields before abandoning the plot to clear another.

As one might expect given the rudimentary state of the tools and implements employed, use of sophisticated inputs such as pest sprays, irrigation, or chemical fertilizers is not predominant. Only seventy-nine of the sampled cultivators brought water to their crops and of these, only a handful paid for the water used. Pesticide or fungicide sprays were used by eighty-two of the respondents. Somewhat larger numbers were accustomed to using animal fertilizer (31.3 per cent of the sample) and an equal number used chemical fertilizer.

There were few innovators among the sampled urban cultivators, at least as regards cultivation practices. This may be a consequence of their fear that use of more sophisticated methods to increase yields may draw unwelcome attention to the potential value of the land, resulting in its confiscation by others. For many, the reason is simply that they are too poor and too dependent on staple products to experiment with new crops or more capital-intensive methods. There is, however, room for considerable increase in the application of various forms of "land enhancing" innovations, to use Todaro's term (Todaro 1981, 277) – for example pesticides, fertilizer, and hybrid seeds – without risking confiscation of lands because of visible capital improvements.

In summary, the overall picture for Nairobi is one in which urban farmers rely heavily on natural growing conditions and cannot afford or do not foresee the benefits of sophisticated cultivation practices such as the use of mechanical tillers, chemical fertilizers, pest sprays, and irrigation. This is understandable, if unfortunate, in view of the small scale, ephemeral nature, and uncertain prospects for their enterprise.

CULTIVATION ASSISTANCE

Rarely are the cultivators of garden plots in Nairobi totally alone in their enterprise. Others, usually family members, have an interest in what is being grown, if only from the point of view of the ultimate consumers of the produce; but spouses and children are also often involved as co-producers. Forty-three per cent of the sampled cultivators acknowledged that they received unpaid help from at least one family member in tilling their urban shamba (Table 32). About 17

per cent said they received help from three or more family helpers. In addition, 20 per cent of the total sample received help from non-family members, with about 8 per cent receiving help from more than one non-family worker (Table 33).

Out of 617 cultivators responding to the question regarding paid labour, 85.3 per cent paid no money at all to their family or non-family helpers. This group comprises almost all of the smaller, subsistence-oriented urban cultivators, including many who farm full-time on their own plots. Amongst those who did pay for help, the modal payment was 30 shillings a week, and only 6.7 per cent of the total sample paid out over 100 shillings each a week for all cultivation help. A very small proportion (1.3 per cent) who are obviously commercial farmers paid out over 300 shillings a week for farm labour on their urban plots.

One of the interesting and unexpected findings of this survey is the fact that the food produced on urban plots is rarely if ever shared among *non-family* helpers, the overwhelming proportion being reserved for the cultivator's immediate family and/or dependants. Only 2.1 per cent stated that they shared food with their non-family cultivators, indicating that "payment of wages in kind" has not been substituted for cash wages, and that the phenomenon of share-cropping is not practised in this region.

11 Harsh Realities: Impediments and Problems of Urban Agriculture

Urban cultivators are faced with a formidable array of potential problems in their efforts to produce food from city lands. Each respondent was asked near the close of the interview to mention the main problems he or she faced in cultivating the shamba plot. There was no preconceived set of categories for this question, and the interviewers simply wrote down the points as they were mentioned by the respondents. A simple content analysis of the *first mentioned problems* listed by the respondents is summarized in Table 34. It is assumed that a cultivator would normally mention the most pressing or important problem first when listing difficulties he or she currently faced.

A significant minority (180 out of a total sample of 617 who responded to this question) appeared not to have encountered any problems in cultivating their plot. While many of these were either first-time cultivators or bona fide farmers on their own properties at the edge of the city, many others were people who had cultivated for a number of years on borrowed land. To have so many cultivators declare themselves problem free is a positive and encouraging sign. It may be taken as evidence that the climate for this type of urban activity is not as unfavourable as one might suppose.

There were, however, many who poured out a litany of complaints. The most common of these problems that faced the urban cultivator is that perennial bane of farmers everywhere: drought or lack of rainfall at the proper season (mentioned as their "first" problem by ninety-six respondents, and as a second or subsequent problem by

the great majority of cultivators). In view of this fact, the low level of irrigation encountered in the author's survey is curious. It may reflect an unwillingness on the part of cultivators to expend capital and labour on improvements that would be wasted if their borrowed land were resumed for development, or if their exposed crops were raided by thieves or City Commission askaris (the Mazingira Institute, by sampling a high proportion of enclosed, residential backyard plots, found a much higher incidence of the use of irrigation than did the author). Predation by various pests (animals, birds, insects, and crop blight) was the first-mentioned problem of another sixty respondents. Flooding or waterlogging of the soil was mentioned first by forty-three cultivators, while forty others put theft at the top of their list of complaints. Soil erosion or poor soil was an environmental factor mentioned first by thirty-six respondents. This was, expectedly, a major problem for the relatively few farmers who cultivated steep slopes in the city.

Other common problems included lack of working capital to buy inputs or tools, physical illness, age, or fatigue of the cultivators themselves, threat of harassment or destruction of their crop by City Commission askaris or others, encroachment of their plots by choking weeds, fear of eviction from borrowed land by landlords, and complaints that their plots were too small to achieve the desired aims of cultivation. Such fears and complaints were mentioned as "first problems" by twenty-six respondents.

Rather than enter into an exhaustive discussion of all problems mentioned by respondents, we shall focus on several which have particular bearing on the conduct of urban agriculture as against peasant farming in rural areas. Thus, while problems of drought, soil erosion, and waterlogging are almost universal among peasants in this region, harassment and theft are not, and therefore attention now focuses on the latter.

HARASSMENT OF URBAN CULTIVATORS

The total of survey respondents who reported actual cases of harassment is summarized in Table 35. These data include all references to harassment, whether or not they were "first mentioned problems." Relative to the sample as a whole, the number of affected cultivators is, fortunately, fairly small. In several cases, however, the respondents reported serious losses as a result of such harassment. One angry

cultivator in the inner city whose crop had recently been virtually destroyed became so upset that he was unable to complete the interview.

When City Commission askaris slash and destroy "offending" crops of maize, they also frequently trample and destroy other, "inoffensive" crops such as beans that are commonly interplanted with maize. Thus a farmer may lose all his or her food crops in the plot. Perhaps for this reason a significant minority of respondents maintain two or more small plots in different places, so that if one is destroyed, the others may escape the attention of the askaris.

LOSS OF CROPS THROUGH THEFT AND PREDATION

The expectation that at least part of the crop they were nurturing would be stolen was fairly high among the sampled cultivators. Responses to this question showed interesting regional variations, and differed also with the length of time respondents had been cultivating in the city. Of the 216 respondents (43 per cent of the total sample) who either experienced or expected some theft of their crop, 187 cultivators (30 per cent) mentioned a loss of about 10 to 20 per cent of their crop (Table 36). A minority (3 per cent) expected heavy losses to thieves, with twelve respondents declaring they expected to lose at least half their crop. But this still leaves two-thirds of the total sample who regarded the level of theft as negligible or tolerable.

It is worth noting that the percentage of respondents mentioning theft as a problem was very much lower (13 per cent) in the Mazingira Institute study than the present survey. Once again, the Mazingira survey was a *household* study in which a high proportion of respondents had enclosed backyard garden plots, whereas the author's survey focused on urban open space.

It is remarkable, in any case, that levels of theft are not much greater in a city with so many poor and hungry people. A possible explanation may be the widespread acceptance of traditional rights of tenants under the Githaka system. Most urban residents are themselves rural migrants, who would probably be aware of traditional usufruct rights and might be accustomed to honouring these rights in their rural home areas. This attitude may have carried over into the urban areas, particularly when the crops involved are mostly subsistence crops, known to be of vital importance to their owners.

The attitude does not appear to be as strong where cash crops are concerned: one of the crops most subject to theft is nduma, which is sold for cash more often than is the case with perhaps most other urban crops.

Thus, while theft was not an uncommon problem, it was clearly one that most respondents were prepared to tolerate. In general, it was viewed as a kind of "negative lottery" which might or might not be a problem for a farmer in any given season. As one cultivator in Area 8 put it: "Thieves don't come very often. But when they come they take a lot. There is not much you can do to stop them."

The difference between open space cultivation and kitchen-garden vegetable growing may explain the higher proportion (50.3 per cent in the present study vis-à-vis 24 per cent in the Mazingira report) who mentioned appreciable crop losses to animal and insect predation. Out of the 311 respondents reporting destruction of some of their crop by pests, 174 (28 per cent) mentioned a loss of between 5 and 9 per cent of their total crop through the actions of a variety of domestic and wild animals, birds, and insects (Table 37). The most significant crop predators in the Nairobi area are porcupines (*Atherurus spp.*), various rodents, baboons (*Papio anubis* and *P. cynocephalus*), the vervet monkey (*Cercopithecus aethiops*), the bush pig (*Potamochoerus koiropotamus*), and the pied crow (*Corvus albus*). The levels of pest predation seem to be quite tolerable to the vast majority of cultivators, however. Fewer than 3 per cent expected to lose more than 30 per cent of their crop in this way, and very few took any measures specifically against faunal predation, other than the use of pesticides against insects. This means that theft looms as a relatively larger threat to the urban cultivator than loss to pests.

In the face of the very real problems of theft and predation, the vast majority of cultivators appear passive or resigned, with 89.4 per cent saying that they took no action to prevent their crop being taken (Table 38). It is difficult to be certain whether this passivity is because the cultivators perceive the risks to be acceptable, or whether the opportunity cost of producing food is very low relative to the cost of protecting the harvest, or alternately whether this attitude springs from a lifelong pattern of resignation to adversity and misfortune.

The most common response of those who did take action to combat theft, was personally to guard the crop at harvest time (3.6 per cent of the sample). Eight respondents paid a guard to watch the plot, while six others had unpaid family or friends act as guards. Some

even constructed look-out platforms. Very few considered building a fence around their plot. A variety of clever strategies was mentioned by other respondents, including the tethering of a savage dog in the shamba, the alleged use of sorcery against thieves, the use of camouflage, the growing of root crops such as potatoes which remain hidden in the ground until ready to be harvested, and the avoidance of crops such as nduma that attract the attention of thieves.

There seems, in summary, to be a particular pattern of crop theft in the city, with areas along the Nairobi River being more prone than elsewhere. There is also an apparent connection between the percentage stolen and the predominant type of crop grown: maize and nduma, both of which are fairly high in cash value relative to bulk, tend to be favourite targets for thieves.

Destruction by pests or loss to thieves represents a loss of potential income or fungibility, but it also represents a loss of actual cash laid out for purchases of seed and other inputs, and an opportunity cost: time spent in fruitless cultivation could have been devoted to alternate income-earning activities, such as kibarua (daily wage labour).

Very many other problems were mentioned by respondents. A recurring theme in several instances was the complaint that the plots of vegetables were in any case too small to feed the cultivator and his or her family, implying a wish for access to more land. Complaints about encroachment by urban weeds were relatively few, because cultivators routinely clear and hoe weeds in the normal course of preparing and tending their plots.

Once established, however, some species of weeds are difficult to eradicate. Nairobi, along with other urban areas of the humid tropics, is beset with a host of these hardy urban weeds, the most noxious of which include the indigenous sodom apple (*Solanum panderiforme*), a low perennial bush with fruit that is poisonous to domestic livestock, *Leonotis spp.*, and castor (*Ricinus communis*), as well as introduced cactus (*Opuntia spp.*), lantana (*Lantana camara*), and Japanese sunflower (*Tithonia diversifolia*), all of which grow in woody thickets two to three metres high throughout the city. Eradication of these weeds would be a costly job for the City Commission, which does not, however, appear to have a comprehensive weed control program, except perhaps in major parks and thoroughfares of the inner city. Urban cultivators provide the city with weed clearance at no cost.

In addition to problems mentioned specifically by cultivators, there are others faced by urban agriculturalists of which they themselves

may not even be aware. For example, those cultivating close to roadsides may not realize the extent of lead contamination from automobile exhaust fumes in the food they harvest (A. Auliciems, personal communication 1985). Similarly, they may not connect illness in their family with contamination of food grown near and irrigated with stream water polluted by human wastes (31 per cent of houses in Nairobi have no flush toilet) and industrial effluent (such as that produced by the tannery at the Kamiti road crossing of the Gatharaini River). The spread of human diseases such as bilharzia is promoted by irrigated agriculture near stagnant ponds and along slow-flowing streams in the Nairobi area, and diseases of plants (such as potato blight in the northern suburbs) and animals (the chicken epidemic raging in the city in 1987) are serious problems in view of an almost complete failure to take countermeasures. The latter problems result from inaction by government as much as from ignorance or poverty on the part of the cultivators.

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PART THREE

The Significance of Urban Agriculture

The previous section painted an empirical picture of a growing sector of the urban space economy in Kenya that has hitherto been largely overlooked. It remains now to set this sector in a broader perspective by pointing out its relationships and its importance in practical as well as theoretical terms. This section attempts these tasks. In doing so, three different levels of significance are identified, moving from the personal or individual level (focusing on interpretation of empirical evidence and stated motives of the cultivators themselves), to the level of the local community (in this case, the city or major part of the city affected by urban cultivation), and finally to the economic, social, and political importance of the phenomenon of urban cultivation at the national level.

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12 The Importance of Open Space Farming to Urban Families

The author's case study of cultivation in Nairobi, when considered together with Rakodi's observations on Lusaka (Rakodi 1988) and the Mazingira Institute's data on Mombasa and Kisumu (Mazingira 1987) suggests that urban agriculture is both prevalent and important in the space economy of a number of large African cities. In discussing the significance of this urban phenomenon, we commence first with the *personal or family* level of significance.

The question regarding personal motives of urban farmers for cultivating their plot produced a rather narrow list of first-mentioned reasons. These break down to four main categories: basic subsistence, diet supplement, cash income supplement, and fungibility (freeing up scarce cash). In addition, there were a number of less common motives. It is clear, however, that the entire sector is driven by a few, very basic imperatives.

An Overwhelming Need for Food. By far the most common reason for cultivating mentioned first by respondents was a variant on the motive of basic subsistence need. Many expressed it simply and starkly with one word: hunger. Others spoke in less graphic, but no less urgent, terms of their need for food (often mentioning the family or children who depended on the food grown on the plots). Overall, more than 75 per cent of respondents mentioned a need for food or outright hunger as a primary motive for cultivation.

About 29 per cent of respondents ate all their produce immediately. In some cases, quite obviously, they did so because they would go hungry without the food their plot produced, or because the food crops were perishable, as for example sukuma wiki or sweet potatoes. However, most cultivators (nearly 72 per cent) reported that they stored some food rather than eating it all immediately. Of these, 70 per cent stored food in their own house, the rest storing with relatives or friends. Very few (6.3 per cent of the sample) built special food storage facilities.

The most common length of time for food storage is between two weeks and two months (Table 39). However, about one-third of the respondents stored food for periods longer than three months. A small number (4.7 per cent) store food for a year or longer. The types of food stored for periods longer than a few days are mostly maize, dried beans, and potatoes. Once again, the results of the present study differ markedly from those of the Mazingira report, which found that only 18 per cent of urban farmers in Nairobi stored food (Mazingira 1987, Annex 6, 21). This tallies with their finding that sukuma wiki was a dominant crop, since it cannot be stored for any length of time. In this regard, it is also noteworthy that the field work in Nairobi for the Mazingira study commenced in early October 1984, around the time of the annual short rains (ibid., 25). Quick-growing crops such as sukuma wiki are usually planted at this time in preference to slow-growing crops such as maize, which are grown during the long rains (when the author's survey was conducted). The difference in timing of the two surveys may explain differences in cropping and related practices.

Growing Vegetables as a Diet Supplement. Many cultivators stated that they depended on their garden plot for fresh vegetables to supplement an otherwise bland and nutritionally inadequate diet based on maize meal. This, again, was a frequent motive of mothers who mentioned that their children needed "catering to." Leafy green vegetables such as the popular sukuma wiki or cabbage were the frequent choice of crops for cultivators who mentioned this dietary factor.

Supplementing Cash Incomes. Apart from subsistence needs, there is also a fairly significant amount of urban produce being earmarked for cash sale. Out of 617 valid responses to this question, 181 (about 30 per cent) stated their intention to sell at least part of their crop

(Table 40). On average, 11.3 per cent of a cultivator's crop will be sold for cash. There is evidence that, for a significant minority of cultivators, farming activities are a commercial venture: 13.4 per cent of the total sample anticipated selling for cash at least half of their current crop. A further 6.8 per cent will sell from 20 to 49 per cent of their produce, while 9.2 per cent are prepared to sell amounts up to 20 per cent. A tiny minority (2.4 per cent) sell more than 90 per cent of their entire crop for cash. There appears to be a pattern relating the size of plot to the percentage of the crop sold for cash. Larger shambas are more likely to earmark a significant percentage for cash sale, while smaller shambas are overwhelmingly subsistence-oriented.

All respondents were asked to place an estimated cash value on their current crop irrespective of whether they decided to sell all or part of it. More than two-thirds estimated their current (mid-1987) crop to be worth in excess of 100 Kenya shillings (Table 41). On average, cultivators estimated the cash value of their crop at just over 400 shillings. This is considerably higher than the average of 262 shillings in actual cash sales recorded in 1985 by the Mazingira study. The discrepancy is difficult to evaluate, but clearly estimates of future sales or market values of crops are at best imprecise, and the author's data may include unrealistically optimistic estimates by some new cultivators who have not previously made actual sales of their own produce.

Amongst the 181 sampled cultivators involved in the sale of crops, forty-seven (7.7 per cent of the entire sample) expected to make at least half their sales to neighbours. A further twenty-eight (4.6 per cent) propose selling at least half the crop to dukas, sixteen (2.5 per cent) will sell half or more to wholesalers, while the largest group, ninety-one respondents or 14.8 per cent of the entire sample, propose selling at least half their crop to "other customers," often as itinerant hawkers or as proprietors of their own kiosks or produce stalls. If the notion of an average shamba crop can be invoked, then 6.8 per cent of such an average crop will be sold to neighbours, 2.4 per cent to wholesalers, 4.4 per cent to dukas, and 13.3 per cent to other customers.

A further point can be made about farmers who place a high cash value on their urban crops. A correlation analysis reveals that such people tend to hire more non-family helpers ($r = 0.49$), and pay larger total wage amounts for such hired help ($r = 0.48$). These

people are really commercial farmers operating on public or private land within the city.

A variant on this theme of a need for cash is the oft-expressed need to have some kind of job, with the unspoken implication that no other income-earning opportunities had so far presented themselves to the respondents. Although, as we have seen, the average cash contribution from cultivation is fairly modest, even small amounts of cash from the sale of produce are highly important to a population that is, by any measure, very poor indeed. For many, the shamba plot is their only reported source of cash income, while no doubt others use it as a seasonal and supplementary means of obtaining cash in addition to that flowing into the household from the non-farm jobs of various family members.

Fungibility: The Place of Food Costs in Household Budgets. Cutting food expenses was a fourth motive commonly mentioned by respondents. This is related to the concept of fungibility, the act of freeing up scarce cash that would otherwise be spent on purchases of food, but which, as a consequence of subsistence cultivation, can then be devoted to other pressing family needs.

Respondents were invited to provide information on household incomes and expenditures so as to convey a picture of the role of food produced from urban shambas in the day-to-day running of their households. Even for urban cultivators who produce a fair proportion of their family's food needs, the cost of food purchases was significant: over half of all respondents spent between 300 and 700 shillings a month on purchases of food (Table 42). The mean monthly household expenditure on food for the whole sample of 618 cultivators in 1987 was 539 shillings, although the statistical distribution was strongly skewed by a minority who spent far more than this. The median expenditure, a more accurate measure in this case, was 450 shillings.

The distribution of family income of cultivators is shown in Table 43. Bearing in mind that the median income for the whole sample was 10,000 shillings a year, we may infer that the average family spent 54 per cent of its reported cash income on purchases of food. This is higher than the 45.1 per cent recorded in 1968 in a survey of Nairobi household budgets by Massell and Heyer, although that survey was based on a middle-income sample (Lowder 1986, 175–6). It also exceeds the average of 40 per cent of income obtained

in a 1978 government survey of urban purchasing patterns (Central Bureau of Statistics 1978, 4). Again, this survey included middle-income households.

It appears to be quite common for the level of food expenditure to be greater than 60 per cent in the low to very low income range. Indeed, in the 1978 government survey, virtually all of the reported household income in the lowest income group was spent on food purchases (ibid., 4). Out of the 414 respondents in the author's survey who divulged their family incomes, more than one-third (36.5 per cent) spent 70 per cent or more of their reported income on food (Table 44). Income may be under-reported in a significant number of cases, however, for reasons discussed earlier. In the current study, food expenditures tended to rise with increasing income until a figure of about 600 shillings a month in expenses was reached, then declined in relative terms as incomes rose further. Income elasticities of food purchases in Nairobi are thought to be very low (0.285 to 0.599: Lowder 1986, 176). Although no firm figures are available, from the current study it seems reasonable to state that home production of food in Nairobi frees up between 100 and 200 shillings a month of the average household's cash that would otherwise be spent on fresh produce.

Production of crops such as maize and beans that can be stored for long periods extends the period of fungibility beyond the actual growing seasons for fresh produce. This is particularly important in the case of families in rented accommodation or supporting children attending high school, when fees must be paid each term: consumption of stored food from a good harvest may permit the saving of the necessary cash.

Other Stated Motives. A variety of other motives for cultivating crops surfaced in the interviews, such as a desire to put vacant land to productive use, a penchant for keeping active, motives related to "self-help" or self-improvement, a love of farming, keeping down weeds, or simply farming because the respondent "saw others doing it." In some cases, both male and female respondents declared that, as their land was a portion of a family inheritance, they were obliged to cultivate it as a condition of retaining possession.

A possible motive for growing such crops as maize and sugar cane in the city which was not mentioned by any respondent, but which is likely in a number of cases, is the use of these as raw materials in

the brewing of illicit liquor or pombe beer. This same factor may also partly explain the adamant opposition by the City Commission towards cultivation of these two crops within the city, although once again this has not been expressed by any official as the reason for the campaign against these crops.

To summarize the most important motives for urban cultivation: over half of the 617 farmers who responded to the question on disposal of their crop expect to use the entire amount harvested to feed their families or dependants. Less than one-quarter of the sample share any of their crop with non-family, and as we have seen, very few pay their helpers in food instead of cash wages. There is, likewise, very little bartering of urban crops for other necessities: only 3 per cent declared that they exchanged food grown on their plots for other needed goods. Cash sales and reduction of cash purchases of food are important in a significant number of cases. Although a small minority of urban cultivators are really commercial farmers, the picture that emerges is essentially one of a family subsistence-oriented urban agricultural sector in which, on average, cultivators allocate 85 per cent of their crop to feed their own family. Minor proportions of the total amount (3 per cent on average) are allocated as gifts to friends and neighbours.

Thus, bearing in mind the very low incomes of most urban farmers, we may conclude that urban cultivation is important to large numbers of working poor in Nairobi, including those who are otherwise unemployed and those holding down low-paying wage or jua kali jobs. The general impression given by the responses in both the Mazingira Institute and York–Kenyatta University surveys is that the vast majority of urban dwellers are motivated to farm vacant land in the city out of sheer necessity, the alternative being the threat of hunger, malnutrition, and even starvation of the cultivators and/or their families. In particular, urban farming is a source of supplementary food and income for the growing numbers of households headed by women. The vast majority of urban cultivators, both male and female, are very poor, landless, subsistence dwellers for whom their little shamba may mean the difference between a precarious but continued existence in the city and a full-blown family catastrophe. As the numbers of the poor increase, and particularly as the ranks of women migrants to the city expand, so too will the phenomenon of urban agriculture.

13 The Importance of Urban Agriculture to the Community and the Nation

We have seen that, in terms of its significance at the level of the family, cultivation of urban lands has a direct benefit in improving, if only marginally, the lives of the poor. In the cities and towns of Kenya, poor families represent the majority class, so that what is significant to them individually is automatically significant to the community as a whole. Urban administrators are at times apt to forget this fact.

Urban agriculture makes a contribution to the community and derives economic significance therefrom in at least five main ways: contributions to aggregate urban productivity; generation of urban employment multipliers; provision of a point of entry for females into the entrepreneurial milieu and the urban labour market; filling vacant niches in the supply of goods and services; and valorization of urban wastelands.

Contributions to Aggregate Productivity. A firm aggregate figure for the total value of urban agriculture in Nairobi and other cities is difficult to estimate with precision, since much of it is subsistence production whose value may not be accurately reflected by market prices. The Mazingira survey estimates the total aggregate production of urban crops in Kenya at 25.2 million kilos of produce, worth about 60.9 million Kenya shillings (Mazingira 1987, 5). The evidence in the author's survey suggests that a total of 25 million shillings a year for the city of Nairobi would be a probable (perhaps even conserva-

tive) estimate. This is based on the ratio of cultivators to the general population, the average figure for crop sales by cultivators, and the savings of household cash that would otherwise need to be spent on food purchases. In addition to direct productivity contributions, however, urban agriculture contributes indirectly, through provision of inputs of raw materials to the food catering, processing, and distribution industries within the city. It may also do more than government price-fixing to keep food costs of urban workers down to a level at which they can survive on the low wages paid to unskilled and semi-skilled workers in the formal sector.

Employment Multipliers from the Sector. While the cultivation of urban lands is significant mainly as a palliative for the underemployed, through its connections with the food preparation and catering sectors of the urban informal sector it actually creates non-farm jobs. Again, the size of the employment multipliers generated by urban farming is difficult to assess. Certainly, a significant number of cultivators (fifty-three, or 8.5 per cent of the total sample) also operate kiosks in the city, and most of these would undoubtedly use food produced on their own shamba plots in the city for at least part of the year. In addition, small dukas are often run by cultivators or else are supplied by them with locally grown produce for sale to customers at a modest profit, giving additional employment to a number of retail workers and produce wholesalers. Supplies for urban shambas, particularly seed and seedlings, heads and handles for jembes and umas, and other incidental inputs, create employment in both the informal and formal industrial sectors.

A Training Ground for Women Entrepreneurs. Urban agriculture, as we have seen, is especially important as a source of supplementary food and income for households headed by women. In addition, however, many migrant women have used it as their entrée into the commercial world of Nairobi's informal sector – for example, by setting up kiosks in the industrial areas and serving prepared food grown on their own shamba plots in the city. The experience of conducting these businesses has enabled a number of women to save for expansion into other jua kali and even formal sector occupations, overcoming the major impediments of lack of education and alternative business experience opportunities. Women not uncommonly co-operate in these ventures and many men have come to recognize

kiosks as a type of enterprise that women are best at running. With the official banning of locally-brewed pombe beer that was once the preserve of women, the food-catering sector appears as a substitute, giving women a much-needed toe-hold in the urban enterprise sector.

Whether this can continue in the future is an open question. As Colin Leys pointed out over a decade ago (Leys 1974, 191), free primary schooling gave women access to education for the first time in Kenya; before that, boys in each family had preference as families struggled to pay school fees. Free education enhanced the upward mobility of women for a time, but as the rewards to primary education have diminished, this opportunity has declined with it. Most urban women cultivators have little or no formal education in any case, and this severely limits their chances for any kind of remunerative jobs in the city.

A Response to Unmet Urban Needs. One of the positive comments made about the informal sector is that it is highly adept at finding and exploiting vacant niches in the economies of Third World countries. The urban agricultural sector, through its linkages with catering, processing, and retailing of perishable foodstuffs for low-income urbanites, has clearly occupied such a niche in Nairobi, and there is every indication that this particular niche will continue to grow as the city itself expands.

It is possible, however, that if the sector does this too successfully, large-scale businesses may be tempted to take over part of this niche, as has happened previously with some jua kali enterprises. It is also possible that political pressures may be brought to bear on urban administrators – for example, by producers in rural areas who resent competition – to suppress the urban agricultural sector.

Valorization of Urban Vacant Land. The rental market for cultivable vacant land in Nairobi is virtually non-existent, and thus urban farming is not a direct contributor to the value of those urban lands that are primarily rent-based. Cultivation does, however, give a use-value to certain types of vacant urban land and, by preventing its takeover by the worst types of urban weeds, may halt its deterioration and lower the cost of its ultimate rehabilitation for urban uses. It would be stretching credibility, however, to assert that this had a significant effect on the ultimate market value of urban land generally. In some

areas, competition for land between urban agriculture and other types of jua kali activity has raised the economic rent yielded by such land, and this competition may have raised its ultimate market value if the land is privately owned. On the other hand, in certain other areas of the city such as high-income residential areas and commercial/retail districts, informal activities undoubtedly have had a negative impact on land values. Jua kali activities tend to be unaesthetic in appearance: untidy, noisy industries and rather unsightly structures, with their accumulating piles of waste, do not project an attractive aura. While urban agriculture is less likely to have this appearance, it too may detract from the air of exclusivity to which some residential areas may aspire, and may be viewed as a negative feature. It could be pointed out, however, that even in upper-income areas of Nairobi, vacant land is frequently overgrown with urban weeds and is unsightly. Also, the ephemeral nature of urban agriculture means that it never becomes a permanent feature of the urban landscape. At the moment, open land in the city is a resource of great value both to the very poorest of recent migrants and to long-time residents of the city. While growing competition between jua kali and farming activities in some favoured areas close to the centre of the city may create local tensions, in most other areas these two subdivisions of the informal sector coexist harmoniously.

While there were a minority of instances in which soil erosion and gullying were observed by the author and the survey staff, most shamba plots in the city were well tended. Indeed, cultivators prefer flat land to the more easily eroded slopes, care for the same plots for a number of years, and take some precautions against gullying and rapid loss of fertility, even though they may be using public land.

It seems clear from responses received in this survey that at least two-thirds of all urban farmers intend to remain in Nairobi permanently. They are not transitory, temporary sojourners who will soon grow tired of their intolerable living conditions and return permanently to their rural home areas. There is evidence that this temporary migrant hypothesis may have been incorrect right from the very beginnings of independent nationhood: even in 1972 the ILO found that the average length of residence of adults in the squatter settlements of Nairobi was almost nine years, and that only 26 per cent had come to the city more recently than five years previously (ILO 1972, 227).

SIGNIFICANCE OF URBAN AGRICULTURE TO NATIONAL DEVELOPMENT

Urban agriculture, as this study has argued, is most appropriately associated with the larger community/economic sector now known as the jua kali sector. At the very highest levels in the Kenyan government, official attitudes to jua kali enterprises have recently become more benign, and there is a realization of the valuable contribution that the informal sector as a whole makes to the national development effort. This is timely. That the urban agriculture sector has so far been excluded from this more favourable official policy is in many ways an anachronism, since the evidence presented here suggests urban farming is a widespread practice with great actual and potential benefit to national productivity. A change of attitude is needed, considering that, in Africa generally, average per capita food production and consumption have been falling, not growing, over the past two decades (Todaro 1981, 255; Hyden 1986, 11); that increases in food imports to Africa have averaged 8.4 per cent a year for over a decade (Bradley 1986, 89), and that malnutrition is a fact of life for many in the city of Nairobi (Mazingira 1987, 10).

While pride in the Kenyan capital is a worthy sentiment, the sort of civic pride that despatches bands of askaris to slash crops is misplaced. Fields of vegetables may be unsightly, but hunger and malnutrition are even more ugly, and refuse to remain hidden from the gaze of foreign visitors, whose favourable impressions of their city the urban administrators seem so eager to cultivate.

The issuing of temporary occupation licence privileges to urban cultivators, which is within the power of the Nairobi City Commission to instigate, is but a small, easily manageable step beyond the current practice of offering such security of tenure to jua kali enterprises. While practical problems of land zoning and servicing arise from the relaxing of restrictions against urban cultivation, these are not insurmountable by any means if goodwill prevails. In addition, immeasurable benefits would be derived from a central government policy of farm extension assistance for urban farmers. This would combat the spread of disease, which our survey found was critical to urban agriculture in some areas, as for instance the outbreaks of potato blight and poultry disease in northern areas of the city. Numerous cultivators complained about shortages of suitable seeds and planting materials, and government assistance here could also be extremely

beneficial. Distribution of improved varieties of seed for crops approved for urban cultivation, made easily available at low cost, could greatly increase the quantity and quality of agricultural output.

Even if no affirmative actions are taken, at the very least the slashing of food crops, including maize, by urban authorities should cease. Maize is the staple food of the poor, and one of the few crops that can be stored for use after the growing season. It is the basis for operating legitimate jua kali enterprises such as kiosks, and helps feed low-income factory and service workers. Slashing maize does not prevent crime, and even if all maize crops were destroyed, plenty of "hideouts for thugs" will remain in the rampant urban weeds and ramshackle buildings in many parts of the city. The notion that maize plants harbour the larvae of malarial mosquitoes may also be discounted, judging by the results of studies in Zambia (Rakodi 1988).

As we have seen, urban agriculture is seasonal in the open spaces of Kenya's cities, implying that imports of food from rural areas must be increased at times of the year when local subsistence production is not taking place. Lack of irrigation is a primary reason for this confinement of cultivation to the rainy seasons. If more facilities for irrigation were to be made available – for example, in the form of reticulated water supplies or more standpipes located in low-income housing areas – agriculture in the cities might well become a year-round activity. Of course, this would require that Nairobi's chronic shortage of water be overcome; a study of the municipal history of Nairobi clearly shows the concern of successive administrations from colonial times to the present over the difficulty of building enough reservoirs and dams to serve the rapidly growing city.

By its nature, urban agriculture is intensive agriculture, and a great deal of labour is expended annually in urban cultivation. To assist in making this occupation more productive can only benefit the country and the government, both in terms of increased output and improved public relations. A positive government attitude might induce more farmers to invest in capital improvements, augmenting the city's total productivity significantly. This change in attitude must incorporate land-use regulations, planning, and zoning.

A thorough revision and codification of the present ad hoc City Commission regulations regarding land use is an absolute necessity if future confusion, inconsistency, and arbitrariness in land law are to be avoided. This should not, however, undermine the present situation in which squatters on urban land have been encouraged to

assert usufruct rights and to practise traditional mixing of land uses. In a nation that is rapidly running out of available high-potential rural land for further settlement, and failing to meet the need to create more jobs through expansion of formal and even jua kali sectors, the open spaces of Nairobi and other cities represent some of the last remaining opportunities for Africans without capital or skills to earn a living.

SOCIAL AND POLITICAL SIGNIFICANCE

Urban agriculture contributes in a number of ways to the evolving social structure of urban Kenya, and consequently promises to develop a political dimension as the numbers of cultivators increase. Four main factors may be listed here.

1 The reunification of migrant families is made easier; no longer must a wife of a male migrant to the city remain in the rural home area, separated for long periods from her spouse, and forced to carry the burden of running a remote farm alone or with only her young children for support. Now, as an urban migrant herself, she has access both to urban land for cultivation and to urban amenities, and may care for her children in the city as she formerly did in the rural areas.

Indeed, it is now questionable whether the profile of the typical migrant, painted a decade or two ago, as being male (with better than normal education) still holds true. The urban gender imbalance of the colonial period seems to have disappeared in the intervening years, and women may now outnumber men in Nairobi, as evidenced from the Mazingira household survey. In addition, the numbers (if not also the proportion) of urban-born Africans increase with every passing year, altering the impact on the city's structure of rural-to-urban migration. It is also questionable whether circular migration is as prevalent as formerly. Up-to-date census material is required to resolve these questions.

2 For people who have no formal education and no other skill to sell to a prospective urban employer, urban agriculture is the one means to secure a living in the city. It, therefore, can be regarded as a necessary factor that makes possible the migration of the landless and unskilled, who would otherwise be virtually unemployable. The sector also appears to be absorbing those who cannot find adequate employment even in the jua kali sector, which would need to grow

at about 10 per cent a year just to keep pace with the stream of migrants currently flowing into Nairobi.

3 Although there are few who would consider it to be a laudable feature of this sector, urban agriculture benefits the petty and large-scale capitalist sectors, not merely by keeping down the cost of urban subsistence and hence the wages of the unskilled urban workforce, but also by enabling a large pool of reserve labour to remain indefinitely in the city, without any costs being borne by the formal sector of the economy.

4 Since most of the very poorest urban dwellers do not have enough cash to buy all their food on a regular basis in any case, there is no danger of the urban agriculture sector (which is largely subsistence-oriented) displacing or damaging the small farming sector in rural areas of the country. On the contrary, rural areas may benefit somewhat by selling seed and other planting material to urban farmers.

TOWARDS A THEORY OF URBAN AGRICULTURE

Broad models of development currently being applied in African contexts have, as noted earlier, largely overlooked the phenomenon of urban agriculture. Some of these models, however, are potentially useful in understanding the forces that have generated this productive sector. There are two parts to the question of the usefulness of existing theories in accounting for empirical patterns of urban agriculture. The first is the question of what these theories lead us, *a priori*, to expect. The second is the question of the extent to which theories help to explain what we have found from the empirical survey of open space cultivators.

Without doubt, the theoretical framework developed by scholars who have taken the dependency model of Third World economies as their point of departure provides more illumination on the place of this sector in the broader economy than does the neoclassical model of development (Forbes 1984). Thus, the dependency-based models accurately predict that larger numbers of Kenyan peasants are being marginalized and rendered landless by the penetration of transnational and national private and state capital. In contrast, Thunian and Ricardian economic rent models are of little help in explaining how such a supposedly marginal, low-return activity, normally found in the

spatial and economic periphery, could have arisen and continue to coexist at the very heart of the space economy, on the most valuable of urban land, with large-scale industrial and commercial establishments among its nearest neighbours. Neoclassical models do not, moreover, explain why there is no urban agriculture component in the urban land rental market.

Concepts of competition in a labour-surplus economy do, however, help explain why this low-return sector is dominated by unschooled female labour, which is forced to concede the better paying formal sector and jua kali jobs to more highly educated males who are plentiful in the "reserve army of the urban unemployed" (Todaro 1981). The concept of opportunity cost also provides insights into the pattern of very long hours spent by the average cultivator in his or her fields. Since alternative, more remunerative activities are not available for many, these people are forced to spent what amounts to a full working week on their shambas, at least in the three-month growing season around the time of the long rains, despite the low return on their labour. Urban agriculture, in other words, is an activity using intensive labour inputs, but these have a very low opportunity cost, since there is little or no market for such unskilled labour. Farming the cities is, in a way, part of the self-maintenance of the unemployed, removing from employers or, indeed, from the government the burden of maintaining this potential labour force in the city.

The urban farming sector utilized what amounts to a common property resource – namely, the areas of public vacant land in the city. To the present, it does not appear to be having the deleterious effect on the quality of this resource predicted by Garret Hardin in his treatise on the "tragedy of the Commons" (Hardin 1968, 1,244). This is because the supply of available open land is still relatively abundant vis-à-vis the numbers of would-be cultivators, who practise a type of shifting cultivation in the city's open spaces. The jua kali sector, which to some extent competes with urban agriculture for the same land, often does more damage to the land than do the cultivators – for example, by dumping waste products and creating areas of bare ground that erode during the rainy season.

As numbers of migrants to the metropolis increase and produce urban-born children that require more and more food, and as more municipal land is resumed for other purposes, the pressure on urban farmland may cause an increase in soil erosion in future years. On the other hand, concepts of customary rights of usufruct for landless

ahoi tend to give some security of tenure, albeit precarious, to urban cultivators; this may encourage a continuation of the practice, observed in this study, of rudimentary soil-conserving measures, such as cover cropping, the planting of windbreaks, and the use of animal manures. These are inconsistent with the "irresponsibility" often cited as a problem in the use of common property resources.

At the individual level, concepts from game theory shed light on the mixed strategies of the cultivators, who hold down extra jobs where possible, cultivate multiple plots in different ecological niches, and interplant crops with different yields and abilities to withstand adverse climatic conditions. These strategies remind us that the "game" in this case is the game of life, and the "payoff" is bare survival for the cultivator and his or her family.

The theoretical significance of the urban agricultural sector reinforces the practical arguments for a positive change in attitude of local authorities towards this sector. Evidence presented here indicates that urban agriculture contributes substantially to overall productivity of the urban population, and is an intrinsic part of the informal sector.

In modelling the economic role of urban agriculture, three distinct aspects can be mentioned. The first is its inculcation of a sense of independence and security in the urban migrant (particularly in women) that is a precondition for the generation of a spirit of entrepreneurship needed for migrants to flourish in a city like Nairobi. The second is the factor of integration of this productive sector with others of the informal sector. Many urban informal (and formal) businesses are based on food produced in urban shambas and subsequently processed and marketed in kiosks, restaurants, and produce stalls in various parts of the city. Concomitantly, the availability of cheap food in the large cities enables the working poor to survive and perhaps even thrive despite their meagre wages from manufacturing or service jobs in the formal or jua kali sectors. Although many people have attacked this as an evil of the capitalist system, the fact remains that cheap food means low wages which mean cheap and therefore competitive manufactured products, implying that the informal agricultural sector definitely supports the urban small-scale manufacturing sector.

This returns us to perhaps the most important economic argument for the existence of urban agriculture – namely, the concept of fungibility, in which the poor, through the production of their own food,

are freeing up scarce cash that would otherwise go towards the purchase of more expensive (often processed or imported) food. In consequence, some of this cash augments household savings, and is thereafter reinvested in small business, or may be used to purchase household items that stimulate the urban manufacturing and service sectors for the benefit of all.

CONCLUSION

As with much research into Third World development problems, this study has probably raised more questions than it has answered. Among the more significant tasks for further research is the investigation of trends in urban agriculture on a continent-wide scale in Africa, and comparison of these with findings in other parts of the Third World. Although this study shows that shamba cultivation is common among longer-term urban residents, it is still by no means clear whether urban agriculture is mostly a temporary adjustment by migrant farmers to conditions in rapidly growing cities, or whether it is evidence of more fundamental trends in the restructuring and reorientation of large African cities, with their strong rural linkages and their distinctive cultural underpinnings. Patterns of circular migration by African urban residents should also be re-examined, to establish whether the significance of this phenomenon is waning and being replaced by the permanent relocation and reintegration of African families in the city. In such permanent city households, urban agriculture by the womenfolk may play an expanded role as a complement to the wages of the household head.

A further subject for future study is the impact and implications of urban agriculture on the whole question of planning in African cities. In particular, management and regulation of all forms of urban land use, and provision of facilities in the parts of the city where the informal sector operates, are planning matters that seem inescapable in most large African municipalities.

Thus, the shambas of Nairobi and other urban centres, which for too long have been ignored by researchers and harassed by administrators, may be viewed as symbols of a group of vigorous, energetic and determined workers who, despite poverty and misfortune, have the drive to succeed and to better their existence. Their plots of cropland are gardens of hope, not wastelands of despair. Acceptance of seasonal cultivation by the urban community and by its current

and future administrators as a legitimate part of the city environment does not imply the abandonment of orderly urban planning or good city government; indeed, planning itself can be a productive tool to aid the harmonious integration of urban farming with other complementary and even competing forms of land use. There are many cities around the world where this integration has been achieved very satisfactorily. All that is required is a change of attitude. For Nairobi, as for other Kenyan cities, the benefits of incorporating urban agriculture into the economic structure must surely outweigh the disadvantages.

APPENDIX ONE

The 1987 York–Kenyatta University Survey of Cultivation in the Open Spaces of Nairobi

The questionnaire survey design used an area sampling approach. The entire Nairobi extra-provincial district (excluding the national park) was covered by a grid of fifty squares numbered sequentially from an origin (square 1) in the southwest corner of the area. Some of these squares contain only a part of the irregularly shaped Nairobi study area. A table of random numbers was used to select a sample of ten squares, representing about a 22 per cent actual coverage of the study area (Maps 3 and 1A).

Within each of the selected squares, the expected frequency of responses obviously differed in accordance with a number of factors that would condition the amount of informal cultivation carried on in those areas. These conditions, together with the irregular boundaries of the city in some of the outermost sample squares, necessitated the use of a weighting system for choosing an appropriate response target for each square. The factors in this weighting system (Table I) were considered *a priori* to be the most significant influences on urban farming, but they are clearly not exhaustive and the accompanying weights are admittedly arbitrary. The latest available maps, supplemented by ground surveys of the sample squares, were then used to determine the expected *relative* frequencies in each (see Table II).

Estimating the expected *absolute* frequencies of responses in each sample square involved the added complications of assessing the limits of the crop cultivation season (before planting commenced and after the harvest, few interviewees would be found in the fields), and the average number of interviews that would be completed per day by each field assistant. A field season of forty-six days, commencing 20 May and including weekends and

holidays, was decided upon. This allowed for the possibility of late planting rains, and covered the period of maximum activity by cultivators in their fields. Since many farmers in the city work their plots on weekends and holidays, this was an important consideration. Interviewers were, however, given the option to interview at weekends either on Saturday or Sunday but not both (they were free to decline weekend interviewing, but most elected to work on Saturdays). Considerations of this kind reduced the field season to a realistic maximum of about thirty-three working days. *A priori*, it was considered that a minimum of twelve to fourteen completed interviews per working day was to be expected from the team. This, as it transpired, was too low: my assistants surpassed that minimum figure by a wide margin, as the data for actual interview frequencies per sample square show (Table III, Map IA).

A further random element was built into the survey procedure, this being the stipulation that only people actually working in their fields would be interviewed. Not all cultivators, of course, choose to work every day or at the same time each day, providing an element of randomness in interviewing that should help ensure unbiased data.

It is interesting to note that, despite the differences in the way this survey was conducted vis-à-vis the Mazingira urban household survey, the results of the two surveys are complementary and mutually supportive on a number of important matters, although some marked differences in specific results are also apparent.

Table I
Weighting of Factors in Estimating Numbers of Cultivators to be Interviewed in Sample Squares

Factor	*Criterion*	*Weighting*
1	A stream passes through at least half the square.	40
2	A main road passes through at least half the square.	40
3	A stream passes through at least a quarter of the square.	20
4	A main road passes through at least a quarter of the square.	20
5	At least half the square is dense residential settlement.	20
6	At least half the square is within the city's official boundary.	20
7	Square contains a major informal sector area.	20
8	Square is in the upland red soil area.	20
9	At least 20 per cent of the square is public open space.	10
10	Area is beyond 3 kilometres from the General Post Office.	10
11	Square contains a large domestic servant population (upper-income housing area).	10
12	Square contains a major institution.	10

Table II
Estimation of Minimum Numbers of Interviews Required in Each Sample Square

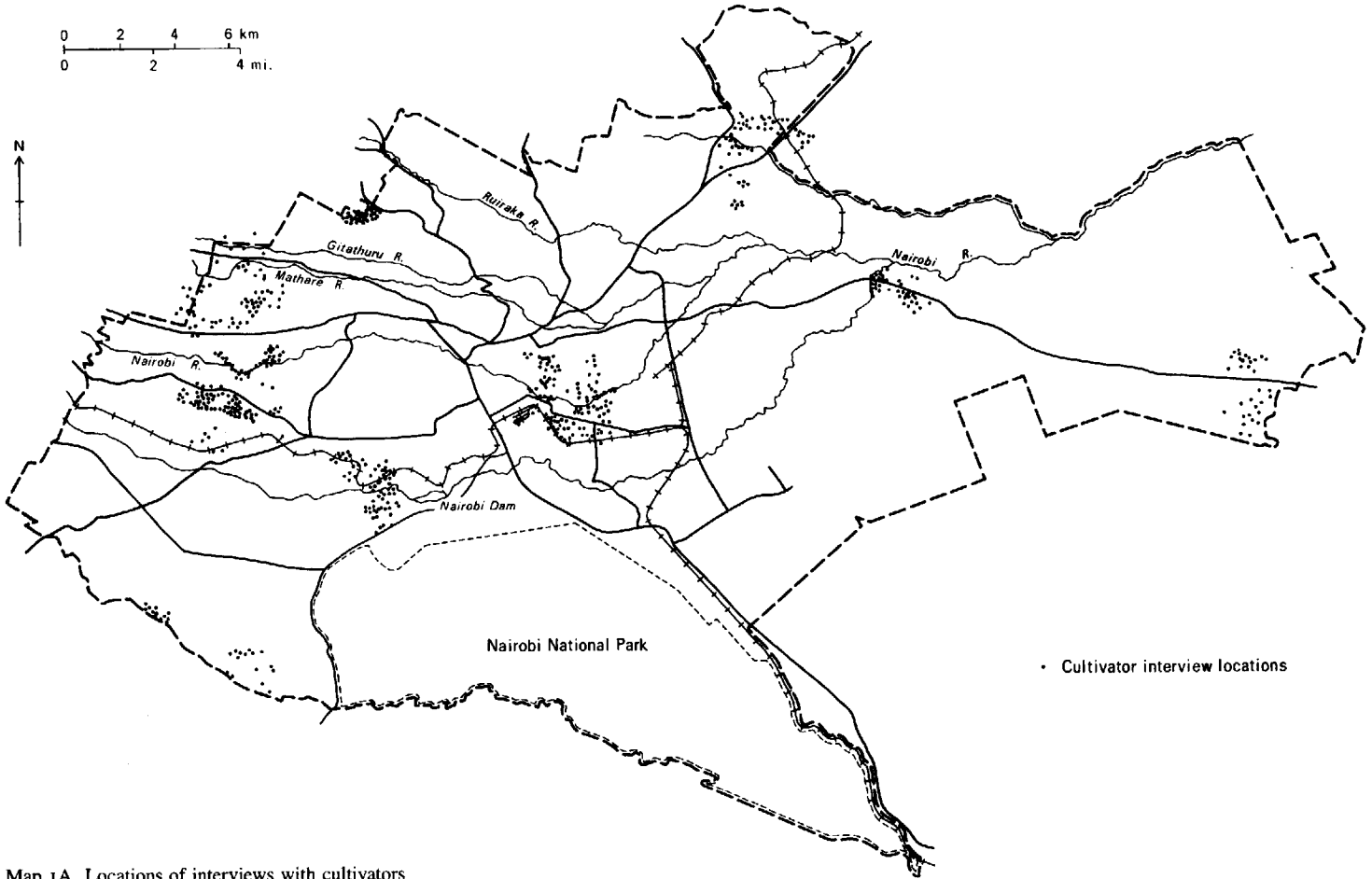
Sample square	*Weighting score (from Table I)*	*Minimum allocated interview time (days)*	*Minimum interviews expected*
1	60	2	24
2	55	2	24
3	175	3	36
4	170	3	36
5	45	1	12
6	85	2	24
7	425	11	132
8	120	3	36
9	75	2	24
10	75	2	24
Total	1,285	31	372

Source: Mazingira Report 1987, Table 3.8, 93.

Table III
Cultivators Interviewed in Each Sample Square

Square	*No. interviewed*	*%*
1	10	1.6
2	15	2.4
3	127	20.6
4	68	11.0
5	45	7.3
6	73	11.8
7	146	23.6
8	65	10.5
9	37	6.0
10	32	5.2
Total	618	100.0

Source: Author's survey, 1987



Map 1A. Locations of interviews with cultivators

APPENDIX TWO

Tables

19 Type of Shamba Location: A Comparison of Inner City (Area 7) and Suburb (Area 3)
20 Respondent Age: A Comparison of Area 7 and Area 3
21 Length of Residence in Nairobi: A Comparison of Area 7 and Area 3
22 Previous Occupation of Cultivators: A Comparison of Area 7 and Area 3
23 Other Jobs Held by Cultivators: A Comparison of Area 7 and Area 3
24 Ownership of Cultivated Land in Nairobi: A Comparison of Area 7 and Area 3
25 Years Cultivating Current Plot: A Comparison of Area 7 and Area 3
26 Estimated Cash Value of Crop: A Comparison of Area 7 and Area 3
27 Ownership of Land Being Cultivated
28 Size of Shamba Plot
29 Years Cultivating Present Plot
30 Shamba Sizes of Male and Female Cultivators Compared (by Sample Area)
31 Major Crops Being Cultivated
32 Family Helpers
33 Non-Family Helpers
34 First Mentioned Problems of Cultivators
35 Harassment of Cultivators
36 Percentage of Crops Stolen
37 Percentage of Crops Lost to Pests
38 Action Taken to Protect Crop
39 Length of Food Storage from Harvest
40 Percentage of Harvest Sold for Cash
41 Estimated Market Value of Crop
42 Food Cost per Month
43 Annual Family Income
44 Food Expense as a Percentage of Family Income

Table 1
Urban Food Production in Six Municipalities of Kenya

Population/household characteristic	*Municipality*						
	All Towns	*Isiolo*	*Kakamega*	*Kisumu*	*Kitui*	*Mombasa*	*Nairobi*
1979 census		11,331	32,025	152,643	4,402	341,148	827,775
Mean HH size	5.7	6.2	6.0	6.0	6.6	5.9	5.4
% Permanent residents	86.0	85.0	88.0	88.0	85.0	88.0	86.0
% Male/female	51/49	52/48	48/52	48/52	49/51	50/50	49/51
% Working Age (15+ years)	48.0	42.0	42.0	45.0	48.0	44.0	53.0
% Uneducated	33.0	39.0	34.0	33.0	35.0	36.0	30.0
% Unemployed	10.0	15.0	9.0	10.0	15.0	9.0	8.0
% Growing crops	29.0	28.0	28.0	30.0	37.0	24.0	30.0
% Keeping livestock	20.0	18.0	19.0	19.0	21.0	18.0	21.0
Median HH income p.a. (KShs)	8,640	7,200	6,480	8,400	7,200	10,800	9,600
% HH with inadequate food supplies	15.0	33.0	15.0	14.0	10.0	9.0	16.0
% HH with food-growing land in town	18.0	40.0	27.0	28.0	39.0	15.0	11.0
% HH growing food on urban or rural land	64.0	60.0	66.0	70.0	79.0	55.0	65.0
Median shamba size (sq. m.)	15.0	150.0	15.0	1,349.0	42.0	15.0	13.0
% Tilling land over 5 years	33.0	43.0	34.0	46.0	50.0	23.0	23.0
% HH selling urban crops	23.0	25.0	15.0	18.0	25.0	21.0	21.0
Median quantity (kg) produced	90.0	43.0	90.0	90.0	90.0	125.0	29.0
Median value in K.Shs of crop sold	846	261	308	n/a	305	n/a	176
% Experiencing crop theft	22.0	29.0	20.0	44.0	13.0	30.0	15.0
% HH storing food	40.0	61.0	52.0	49.0	65.0	36.0	18.0
% HH hiring labour	9.0	11.0	21.0	2.0	8.0	6.0	7.0
% HH using fertilizer	11.0	7.0	10.0	0.0	11.0	6.0	18.0
% HH using pesticide	10.0	14.0	9.0	3.0	6.0	8.0	12.0
% harassed over urban farming	3.0	0.0	9.0	0.0	3.0	7.0	1.0
% using irrigation	45.0	66.0	21.0	31.0	20.0	31.0	66.0
% keeping livestock	51.0	52.0	49.0	55.0	59.0	47.0	51.0
n =	455	56	56	39	64	86	154

Source: Mazingira Institute, 1987: Tables 2.1 (40); 2.2 (42), 2.7 (45); 2.9 (47); 2.13 (51); 2.16 (56); 2.18 (56); 2.43 (79); 2.45 (82); 3.1 (85); 3.2 (87); 3.9 (95); 3.14 (101); 3.18 (106); 3.19 (106); 3.23 (110); 3.25 (113); 3.27 (114); 3.31 (117); 3.42 (125); 3.55 (134); 3.67 (144); 3.72 (149); 41 (183).

Table 2
Location of Major Urban Shamba: Comparative Data for Six Kenyan Municipalities (per cent)

Location	*All Towns*	*Isiolo*	*Kakamega*	*Kisumu*	*Kitui*	*Mombasa*	*Nairobi*
Backyards	49.0	39.0	41.0	23.0	19.0	55.0	71.0
Roadside	17.0	14.0	5.0	15.0	41.0	21.0	10.0
Riverside	13.0	23.0	14.0	26.0	20.0	4.0	9.0
Other	21.0	23.0	39.0	36.0	20.0	21.0	9.0
n =	455	56	56	39	64	86	154

Source: Mazingira Report 1987, Table 3.8, 93.

Table 3
Ownership of Land Where Food is Grown: Comparative Data for Six Kenyan Municipalities (per cent)

"Owner"	*All Towns*	*Isiolo*	*Kakamega*	*Kisumu*	*Kitui*	*Mombasa*	*Nairobi*
Household	41.0	64.0	30.0	69.0	55.0	23.0	33.0
Municipality	22.0	9.0	27.0	15.0	22.0	16.0	31.0
Government	20.0	14.0	16.0	8.0	11.0	36.0	20.0
Private firm	7.0	4.0	2.0	0.0	8.0	9.0	9.0
Other	11.0	9.0	25.0	8.0	5.0	15.0	8.0
n =	455	46	56	39	64	86	154

Source: Mazingira Report 1987, Table 3.11, 97.

Table 4
How Household Obtained Access to Land: Comparative Data for Six Kenyan Municipalities (per cent)

Land Was:	*All Towns*	*Isiolo*	*Kakamega*	*Kisumu*	*Kitui*	*Mombasa*	*Nairobi*
Bought	21.0	21.0	14.0	18.0	28.0	13.0	26.0
Given free	59.0	73.0	63.0	62.0	50.0	67.0	51.0
Rented	4.0	0.0	5.0	0.0	9.0	4.0	3.0
Other	16.0	5.0	18.0	21.0	13.0	16.0	20.0
n =	455	56	56	39	64	86	154

Source: Mazingira Report 1987, Table 3.12, 99.

Table 5
Percentage of Households in Six Kenyan Municipalities Producing, Consuming and Selling Urban Crops

	All Towns	*Isiolo*	*Kakamega*	*Kisumu*	*Kitui*	*Mombasa*	*Nairobi*
Producing	29.0	50.0	51.0	30.0	57.0	26.0	20.0
Consuming	27.0	47.0	50.0	30.0	56.0	25.0	18.0
Selling	7.0	12.0	15.0	5.0	14.0	5.0	4.0
n =	1,576	113	109	132	112	332	778

Source: Mazingira Report 1987, Table 3.19a, 107.

Table 6
Labour Inputs in Urban Food Production: Gender Composition of Labour Categories, All Municipalities (per cent)

	HH Heads	*Unpaid HH Labour*	*Hired Labour*	*Other*	*Total*
Male	36.0	44.0	82.0	100.0	44.0
Female	64.0	56.0	18.0	0.0	56.0
n =	427	480	90	1	998

Source: Mazingira Report 1987, Table 3.33, 118.

Table 7
Major Urban Crops: Percentage of Households Growing Crop in Six Kenyan Municipalities

	All Towns	*Isiolo*	*Kakamega*	*Kisumu*	*Kitui*	*Mombasa*	*Nairobi*
Maize	59.0	86.0	57.0	64.0	97.0	52.0	35.0
Beans	41.0	77.0	38.0	18.0	78.0	9.0	38.0
Sukuma wiki	31.0	11.0	46.0	10.0	11.0	1.0	63.0
Other greens	16.0	21.0	9.0	10.0	8.0	0.0	31.0
Cowpeas	17.0	0.0	13.0	10.0	13.0	47.0	12.0
Potatoes	10.0	9.0	2.0	15.0	0.0	15.0	14.0
n =	455	56	56	39	64	86	154

Source: Mazingira Report 1987, Table 3.17, 104.

Table 8
Locational Types of Sampled Plots

Type of location	*No. Interviewed*	*%*
Roadside	176	28.5
Riverside	100	16.2
Park	8	1.3
Other public land	90	14.6
Private residential	195	31.6
Industrial	9	1.5
Railside	20	3.2
Other	20	3.2
Total	618	100.0

Source: Author's survey, 1987

Table 9
Proportion of Male and Female Cultivators

Gender	*No.*	*%*
Male	221	35.8
Female	397	64.2
Total	618	100.0

Source: Author's survey, 1987

Table 10
Age of Cultivators

Age Group	*No.*	*%*
19 years and under	17	2.7
20–29	137	22.2
30–39	169	27.3
40–49	119	19.2
50–59	105	17.0
60–69	43	7.0
70 years and over	28	4.5
Total	618	100.0

Source: Author's survey, 1987

Table 11
Number of Children

No. of Children	*No. of Cultivators*	*%*
0	66	10.7
1	30	4.9
2	72	11.7
3	57	9.2
4	76	12.3
5	77	12.5
6	87	14.1
7	42	6.8
8	56	9.1
9	18	2.9
10	17	2.8
11	4	0.6
12	8	1.3
More than 12	8	1.3
Total	618	100.0

Source: Author's survey, 1987

Table 12
Years of Primary School

Years of School	*No. of Cultivators*	*%*
0	178	28.8
1	0	0.0
2	15	2.4
3	32	5.2
4	41	6.6
5	41	6.6
6	39	6.3
7	220	35.6
8	52	8.4
Total	618	100.0

Source: Author's survey, 1987

Table 13
Years of Secondary School

Years of School	*No. of Cultivators*	*%*
0	488	79.0
1	10	1.6
2	43	7.0
3	8	1.3
4 or more	69	11.2
Total	618	100.0

Source: Author's survey, 1987

Table 14
Years of Other Schooling

Years of Schooling	*No. of Cultivators*	*%*
0	586	94.8
1	9	1.5
2	12	1.9
3	7	1.1
4	0	0.0
5	3	0.5
6	1	0.2
Total	618	100.0

Source: Author's survey, 1987

Table 15
Years of Residence in Nairobi

Years	*No. of Cultivators*	*%*
1 or less	38	6.2
2	24	3.9
3–5	54	8.8
6–9	75	12.2
10–19	141	22.3
20–29	114	18.5
30–39	83	13.5
40–49	67	10.8
50 and over	22	3.7
Total	618	100.0

Source: Author's survey, 1987

Table 16
Previous Occupation of Cultivators

Occupation	*No. of Cultivators*	*%*
School Pupil	137	24.7
Shamba Work	233	42.0
Wage Work	54	9.7
Unemployed	98	17.7
Other	33	5.9
Total	555	100.0

Source: Author's survey, 1987

Table 17
Other Income-Earning Jobs of Cultivators

Other Job	*No. of Cultivators*	*%*
No other job	291	47.2
Other urban informal	163	26.4
Urban formal sector	76	12.3
Public sector	61	9.9
Other farming	21	3.4
Other n.e.s.	5	0.8
Total	617	100.0

Source: Author's survey, 1987

Table 18
Hours Worked at Other Job

Hours per Week	*No. of Cultivators*	*%*
Under 10	14	5.0
10–19	16	5.8
20–39	47	17.3
40–59	157	57.4
60 and over	40	14.6
Total	274	100.0

Source: Author's survey, 1987

Table 19
Type of Shamba Location: A Comparison of Inner City (Area 7) and Suburb (Area 3)

Type of Location	*Area 7 (% of Subsample)*	*Area 3 (% of Subsample)*
Roadside	27.5	28.9
Riverside	14.2	23.4
Park	0.0	3.1
Other public land	25.0	7.0
Private residential	25.0	36.7
Industrial	1.7	0.0
Railside	5.8	0.8
Other	0.8	0.0
Total	100.0	100.0
Subsample size	146	127

Source: Author's survey, 1987; percentage figures may not add to 100 due to rounding.

Table 20
Respondent Age: A Comparison of Area 7 and Area 3

Respondent Age	*Area 7 (% of Subsample)*	*Area 3 (% of Subsample)*
0–19 years	6.7	0.0
20–29 years	29.5	12.5
30–39 years	23.2	26.8
40–49 years	20.0	26.7
50–59 years	13.2	19.5
60 and over	7.4	14.9
Total	100.0	100.0
Subsample size	146	127

Source: Author's survey, 1987; percentage figures may not add to 100 due to rounding.

Table 21
Length of Residence in Nairobi: A Comparison of Area 7 and Area 3

Years Living in Nairobi	*Area 7 (% of Subsample)*	*Area 3 (% of Subsample)*
0–2	14.2	2.3
3–4	6.7	2.4
5–9	13.3	9.3
10–19	24.2	15.6
20–29	21.5	18.7
30 and over	19.8	51.9
Total	100.0	100.0
Subsample size	146	127

Source: Author's survey, 1987; percentage figures may not add to 100 due to rounding.

Table 22
Previous Occupation of Cultivators: A Comparison of Area 7 and Area 3

Previous Occupation	*Area 7 (% of Subsample)*	*Area 3 (% of Subsample)*
School student	36.4	23.0
Farm work	28.8	55.2
Wage work	7.6	8.0
Unemployed	19.5	11.5
Other	7.6	2.3
Total	100.0	100.0
Subsample size	146	127

Source: Author's survey, 1987; percentage figures may not add to 100 due to rounding.

Table 23
Other Jobs Held by Cultivators: A Comparison of Area 7 and Area 3

Other Job	*Area 7 (% of Subsample)*	*Area 3 (% of Subsample)*
No other job	35.8	42.2
Other urban informal	34.2	31.3
Other urban formal	10.0	18.8
Public sector	17.5	3.1
Other farming	0.0	3.9
Other n.e.s.	2.5	0.8
Total	100.0	100.0
Subsample size	146	127

Source: Author's survey, 1987; percentage figures may not add to 100 due to rounding.

Table 24
Ownership of Cultivated Land in Nairobi: A Comparison of Area 7 and Area 3

Land Ownership	*Area 7 (% of Subsample)*	*Area 3 (% of Subsample)*
Don't know	3.3	3.1
Public land	80.0	25.8
Private landlord	14.2	28.1
Self/family	2.5	43.0
Total	100.0	100.0
Subsample size	146	127

Source: Author's survey, 1987; percentage figures may not add to 100 due to rounding.

Table 25
Years Cultivating Current Plot: A Comparison of Area 7 and Area 3

Years	*Area 7 (% of Subsample)*	*Area 3 (% of Subsample)*
0–1	21.5	7.8
2–4	49.2	29.6
5–9	11.2	29.7
10–14	9.3	14.9
15–19	3.5	5.5
20–29	4.4	7.1
30 and over	0.9	5.6
Total	100.0	100.0
Subsample size	146	127

Source: Author's survey, 1987; percentage figures may not add to 100 due to rounding.

Table 26
Estimated Cash Value of Crop: A Comparison of Area 7 and Area 3

Cash Value of Crop (K Shs)	*Area 7 (% of Subsample)*	*Area 3 (% of Subsample)*
No value	12.5	10.9
1–99	31.7	9.5
100–199	27.5	13.3
200–499	15.0	32.0
500–999	5.8	21.9
1,000–9,999	6.6	10.2
10,000 and over	0.8	2.3
Total	100.0	100.0
Subsample size	146	127

Source: Author's survey, 1987; percentage figures may not add to 100 due to rounding.

Table 27
Ownership of Land Being Cultivated

Who Owns Land?	*No. of Cultivators*	*%*
Don't know	16	2.6
Public land	280	45.3
Private landlord	176	28.5
Self/family	146	23.6
Total	618	100.0

Source: Author's survey, 1987

Table 28
Size of Shamba Plot

Size Category (sq. m.)	*% of Sample*
1–99	14.3
100–199	9.6
200–399	14.3
400–599	6.6
600–799	4.9
800–999	3.7
1,000–1,499	16.6
1,500–1,999	5.0
2,000–4,999	11.1
5,000–9,999	8.3
10,000–14,999	3.2
15,000 and over	2.3
Total (n = 614)	100.0

Source: Author's survey, 1987; percentage figures may not add to 100 due to rounding.

Table 29
Years Cultivating Present Plot

Years of Cultivation	*No. of Cultivators*	*%*
1	92	15.2
2	104	17.2
3	91	15.0
4	47	7.8
5–9	123	20.3
10–19	92	15.2
20–29	33	5.5
30–39	14	2.5
40 and over	10	1.7
Total	618	100.0

Source: Author's survey, 1987

Table 30
Shamba Sizes of Female and Male Cultivators Compared: By Sample Area

	Females		*Males*	
Sample Area	*Frequency*	*Av. Shamba Size (sq. m.)*	*Frequency*	*Av. Shamba Size (sq. m.)*
1	8	1,225	2	1,200
2	2	875	13	3,513
3	81	3,512	44	5,650
4	45	1,553	22	1,430
5	33	5,903	12	5,756
6	43	1,042	29	1,074
7	82	316	62	1,710*
8	48	1,503	17	2,076
9	28	1,582	9	1,958
10	24	2,225	8	1,450
All areas (n = 612)	394	2,034	218	2,747

Source: Author's survey, 1987

*Includes a single shamba of six hectares. With this removed, the average male shamba plot size is 754 sq. m.

Table 31
Major Crops Being Cultivated (Dominant Crop as Estimated by Interviewers)

Crop Type	*No. of Cultivators*	*%*
Maize	338	54.7
Beans	71	11.5
Potatoes/sweet potatoes	54	8.7
Sukuma wiki	38	6.1
"Arrowroot" (cocoyams)	33	5.3
Cassava	6	1.0
Other	78	12.6
Total	618	100.0

Source: Author's survey, 1987

Table 32
Family Helpers

No. of Helpers per Family	*No. of Cultivators*	*%*
0	353	57.2
1	86	13.9
2	73	11.8
3	45	7.3
4	35	5.7
5	10	1.6
6	6	1.0
7	3	0.5
8	5	0.8
9	1	0.2
Total	617	100.0

Source: Author's survey, 1987

Table 33
Non-family Helpers

No. Per Cultivator	*No. of Cultivators*	*%*
0	499	80.9
1	67	10.9
2	22	3.6
3	13	2.1
4	5	0.8
5	2	0.3
6	3	0.5
7	1	0.2
8	2	0.3
9	3	0.5
Total	617	100.0

Source: Author's survey, 1987

Table 34
First Mentioned Problems of Cultivators

Problem		*No. of Cultivators*	*%*
1	Drought/low rain/lack of rain	96	15.5
2	Pests/diseases	60	9.7
3	Flooding/water-logging	43	7.0
4	Theft	40	6.5
5	Soil erosion/poor soil	36	5.8
6	Threat of eviction/destruction of crop	26	4.1
7	Physical illness/age/fatigue	25	4.0
8	Little capital	21	3.4
9	Difficulty/cost of getting seeds/inputs	8	1.3
10	Other problems	82	13.4
11	No problems	180	29.2
	Total	617	100.0

Source: Author's survey, 1987

Table 35
Harassment of Cultivators

Source of Harassment	*No. Reporting*
Askaris	12
Landowners	12
Others	14
Total	38

Source: Author's survey, 1987

Table 36
Percentage of Crops Stolen

% of Crop	*No. of Cultivators*	*%*
0	356	57.7
1–4	11	1.8
5–9	44	7.1
10–19	161	26.1
20–29	28	4.5
30–49	5	0.8
50 and over	12	2.0
Total	617	100.0

Source: Author's survey, 1987

Table 37
Percentage of Crops Lost to Pests

% of Crop	*No. of Cultivators*	*%*
0	307	49.7
1–4	46	7.4
5–9	174	28.2
10–19	77	12.5
20–29	11	1.8
30 and over	3	0.5
Total	618	100.0

Source: Author's survey, 1987

Table 38
Action Taken to Protect Crop

Type of Action	*No. of Cultivators*	*%*
Personally guard crop/plot	22	3.6
Unpaid family/friends guard plot	6	1.0
Pay guard for plot	8	1.3
Build a fence around plot	3	0.5
Other actions to protect crop	26	4.2
No action to protect crop	552	89.4
Total	617	100.0

Source: Author's survey, 1987

Table 39
Length of Food Storage from Harvest

Storage Time	*No. of Cultivators*	*%*
Do not store	181	29.3
1–7 days	22	3.6
1–4 weeks	16	2.6
1–2 months	171	27.8
3–6 months	184	29.9
6–12 months	14	2.3
1 year and over	29	4.7
Total	617	100.0

Source: Author's survey, 1987

Table 40
Percentage of Harvest Sold for Cash

% of Harvest	*No. of Cultivators*	*%*
0	436	70.7
1–9	24	4.0
10–19	32	5.2
20–29	24	3.9
30–49	18	2.9
50 and over	83	13.4
Total	617	100.0

Source: Author's survey, 1987

Table 41
Estimated Market Value of Crop

Value in KShs.	*No. of Cultivators*	*%*
Value unknown	101	16.4
1–99	92	15.0
100–499	271	44.0
500–999	106	17.3
1,000–5,000	39	6.5
5,000 and over	8	1.4
Total	617	100.0

Source: Author's survey, 1987

Table 42
Food Cost per Month

Cost (KShs.)	*% of Sample*
Under 100.0	5.1
100.0–299.9	16.4
300.0–499.9	29.4
500.0–699.9	28.3
700.0–999.9	9.9
1,000.0–1,499.9	5.7
1,500 and over	5.3
Total (n = 597)	100.0

Source: Author's survey, 1987; percentage figures may not add to 100 due to rounding.

Table 43
Annual Family Income

Income Category (KShs.)	*% of Sample*
1.0–999.9	0.2
1,000.0–1,999.9	6.7
2,000.0–4,999.9	16.7
5,000.0–9,999.9	19.8
10,000.0–14,999.9	23.4
15,000.0–19,999.9	12.0
20,000.0–24,999.9	10.5
25,000.0–49,999.9	5.7
50,000.0 and over	2.9
Total (n = 418; frequency of non-responses: 200)	100.0

Source: Author's survey 1987; percentage figures may not add to 100 due to rounding.

Table 44
Food Expense as a Percentage of Family Income

Expense (% of Income)	*% of Sample*
0.0–19.9	13.5
20.0–29.9	12.8
30.0–39.9	14.7
40.0–49.9	10.1
50.0–59.9	6.3
60.0–69.9	6.0
70.0 and over	36.5
Total (n = 414; frequency of non-responses: 204)	100.0

Source: Author's survey, 1987; percentage figures may not add to 100 due to rounding.

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Glossary of Kiswahili Terms

askari	policeman
dhobi	washing, washerfolk
duka	retail shop, market stall
fundi	expert, tradesman
jembe	hoe
jiko	charcoal stove
jua kali	fierce sun (term used for informal urban sector)
kibarua	casual labour
kunguni	bedbug (the term is applied to high-density African workers' quarters)
mahindi	Indian corn, maize
matatu	from "mang'otore matatu": thirty cents (flat fare for an informal matatu taxi)
mathare	the dracaena tree (term applied to a squatter area alongside the Mathare River)
mzungu	white (applied to Europeans)
nduma	cocoyam or "arrowroot" crop
panga	large bush knife, machete
posho	maizemeal
pombe	local beer
shamba	garden, small farm
shauri	business, affair, argument
sukuma wiki	stretch out or last the week (term used for a local vegetable)
uma	pronged hoe or fork

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Index